DOCUMENT RESUME

ED 144 711 PS 009 580

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TITLE Influences on Learning in Early Childhood: A Literature Review.
INSTITUTION Hewitt Research Center, Berrien Springs, Mich.
SPONS AGENCY Community Services Administration (DHEW), Washington, D.C.
PUB DATE Aug 75
GRANT OEO-50079-G-73/01
NOTE 307p.

EDRS PRICE MF-$0.83 HC-$16.73 Plus Postage.
DESCRIPTORS *Child Development; *Cognitive Development; Cognitive Processes; *Early Childhood Education; Early Experience; Environmental Influences; Historical Reviews; Intelligence; *Interdisciplinary Approach; *Literature Reviews; Neurological Organization; Parent Influence; Personal Values; Readiness (Mental); Reading; Reading Development; Self Concept; Sex Differences; Sex Role

ABSTRACT

This paper is an interdisciplinary review of literature related to early childhood education over the past five years. Although some references to infancy and toddlerhood are included, the emphasis is on children's learning and education in the preschool and primary grades (age 3 through age 9-10). Chapter I, The Early Childhood Problem, is an overview of the direction early childhood research and theory have taken since the turn of the century. Other chapters are: (2) The Role of Parents in Early Learning; (3) Values and the Self; (4) The Learning Environment; (5) Neurophysiology: Ontogeny of the Brain and Learning; (6) Neurophysiological Factors in Learning; (7) Readiness for School; (8) Sex-difference Effects; (9) Age and Achievement (the interaction of maturation and cognitive development); (10) Learning to Read; (11) Effectiveness of Early Schooling; (12) A Positive Approach to Early Learning (an overview of the last 200 years of early education practice); and (13) Early Childhood Education: Issues and Recommendations. (SB)

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INFLUENCES ON LEARNING IN EARLY CHILDHOOD

A Literature Review

Prepared for
U.S. Community Services Administration, H.E.W.
(formerly U.S. Office of Economic Opportunity)
Under Research Grant No. 50079-G-73/01

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Berrien Springs, Michigan 49104

August, 1975

PS 009580

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ACKNOWLEDGEMENTS

In this multidisciplinary review of literature related to early childhood education over the last five years, the following specialists and generalists, among others, provided distinctive personal counsel and guidance in the development of this analysis and review--some minimal, some extensive. We are grateful for their help, although none of them are in any way accountable for the final report.

Affective influences, including parental attachment and deprivation: Mary Ainsworth and Silvia Bell, Johns Hopkins University; John Bowlby, M.D., World Health Organization and Tavistock Clinic, London; Torsten Husén and Robert Liljefors, University of Stockholm; Umberto Nagera, M.D., University of Michigan Medical School; Glenn Nimnicht, Far West Laboratory for Educational Research and Development; Henry Ricciuti, Cornell University; René Spitz, University of Colorado; Robert D. Strom, Arizona State University; Otto Weininger, Ontario Institute for Studies in Education, Canada.

Hearing: Anne Morency and Joseph Wepman, University of Chicago; Jerome Rosner, University of Pittsburgh.

Intersensory perception: A. Jean Ayres, University of Southern California; Harold G. Birch, M.D., Albert Einstein School of Medicine, Yeshiva University; David Metcalf, M.D., University of Colorado Medical School; Anne Morency and Joseph Wepman, University of Chicago.

Learning: Millie Almy, Nancy Bayley, Marjorie Honzik, Catherine Landreth, and William Rohwer, University of California, Berkeley; Benjamin Bloom, University of Chicago; David Elkind, University of Rochester; Hans Furth, University of Sussex; Barbel Inhelder and Jean Piaget, University of Geneva; Gilbert Voyat, College of the City of New York.

Neuropsychology and neurophysiology: Harold G. Birch, M.D., Yeshiva University; David Metcalf, M.D., University of Colorado Medical School; Anneliese M. Pontius, M.D., New York University; T. Joseph Willey, Loma Linda University Medical School and research associate of Sir John Eccles, State University of New York, Albany.

Parent attitudes and parenting programs: Sue Ambron and Robert Hess, Stanford University; Susan Gray, George Peabody University; Phyllis Levenstein, Long Island, New York; Anne O'Keefe, Home Start, OCD-HEW; Earl Schaefer, University of North Carolina; David Weikert and Dennis Deloria, High-Scope Foundation, Michigan.

Reading: Marianne Frostig, Marianne Frostig Center of Educational Therapy, Los Angeles; Robert Hillerich, National College of Education, Evanston, Illinois; Frances Ilg, M.D., Gesell Institute; Walter MacGinitie, Columbia University.

School entrance age studies: Ronald Davie, National Children's Bureau, London; George S. Fidone, M.D., University of Texas Medical School; Joseph Halliwell, St. Johns University; Earl J. Ogletree, Chicago State University; Norman Silberberg, Sister Kenny Institute, Minneapolis.

Vision: Leonard H. Burros, Snyder, New York; Charles M. Drain, Clayton, Missouri; Darrell Harmon, University of Wisconsin; Homer Hendrickson and A. M. Skeffington, Optometric Extension Foundation, Inc.; Henry Hilgartner, M.D., Austin, Texas; Robert Kraskin, Washington, D.C.; William Ludlam, Pacific University; George Milkie, American Optometric Association; Frank Newton, M.D., Dallas, Texas; Henry B. Peters, University of Alabama; Francis Young, Washington State University.

General: Milton E. Akers, Governor's Office, Florida; Sally Allen and Oralie McAfee, Education Commission of the States; Louis Ames and Frances Ilg, M.D., Gesell Institute; Gilbert R. Austin, UNESCO, Paris, and University of Maryland; Inger Berg, National Council for Innovation in Education, Oslo, Norway; Carl Bereiter, Ontario Institute for Studies in Education; Robert Boger, Michigan State University; Urie Bronfenbrenner, Cornell University; Annie Butler, Indiana University; Bettye Caldwell, University of Arkansas; Paul Dokecki, George Peabody University; Malcolm P. Douglass, Claremont Graduate School; Martin Engel, National Demonstration Center in Early Childhood Education, Washington, D.C.; Siegfried Engelmann, University of Oregon; L. R. Fernig and Yuri Alferov, International Bureau of Education, Geneva; Ira Gordon, University of Florida; Alex Grey, University of Sydney, Edith Grotberg, Office of Child Development, HEW; Herald Habenicht, M.D., Andrews University; James L. Hymes, Jr., Carmel, California; Jerome Kagan, Harvard University; Lillian Katz and staff, ERIC-ECE, University of Illinois; Alice Keliher, University of Arizona; Kay Kuzma, Loma Linda University; Eve Malmquist, University of Linköping; Margaret Mead, American Museum of Natural History; Robert Moon, Council for Exceptional Children and Andrews University; Shirley Moore, University of Minnesota; Ruth Murdoch, Andrews University; Shigefumi Nagano, National Institute for Educational Research, Tokyo; Rene Ochs, UNESCO, Paris; Conrad Reichert, Andrews University; Karl E. Schaefer, M.D., Brown University; Irving Sigel, Educational Testing Service, Princeton, New Jersey; Carolyn Stern, University of California, Los Angeles; Harold Stevenson, University of Michigan; Paul Torrance, University of Georgia; Helmut and Gisela von Kügelen, Waldorf Schools, Stuttgart; Burton White and Sheldon White, Harvard University; Edward Zigler, Yale University.

The following generalists and specialists, among others, read the manuscript in its near-final form. None of them, however, are accountable for conclusions drawn or inferred from research analyses presented here: Silvia Bell, Johns Hopkins University; Carl Bereiter, Ontario Institute for Studies in Education; Jere Brophy, University of Texas, Austin; Urie Bronfenbrenner, Cornell University; Thomas Geraty, Andrews University; Joseph T. Halliwell, St. Johns University; Alden Moe, Purdue University; Otto Weininger, Ontario Institute for Studies in Education.

Our gratitude is also due the staff of ERIC-ECE, Urbana, Illinois, to many specialists of the various echelons of the Department of Health, Education and Welfare, including, among others, the Office of Child Development, the Office of Education, and the National Institutes of Health, and to the research and clerical staffs of the Hewitt Research Center. The consistently cooperative and businesslike attitude of the OEO (later CSA-HEW) directors and project staff greatly facilitated both objectivity and efficiency in completing the study.

All listed authors shared in the writing. However, Martha Lorenz, senior research associate at Hewitt Research Center, served as project manager, writer and editor-in-chief. T. Joseph Willey is the primary author of Chapter 5, assisted by Dennis Moore. Ingram DuPreez and Dennis Moore are graduate fellows at the Hewitt Research Center. The project director only is ultimately accountable for this review.

Raymond S. Moore, Project Director

INTRODUCTION

In the late 1950's, with the gradual refinement of the science of electroencephalography (EEG), several EEG-based studies of the young child's brain suggested that the central nervous system may not be ready until 8 or 9 years of age or older for the sustained high cortical effort that enables a child to learn basic academic skills with relative ease. There was some indication that until this age a child may be influenced strongly by his emotional centers, and thus his behavior may be dominated by his emotions more than by reason.

Inquiry among students of the brain revealed that, because of the state of the art, some EEG techniques and conclusions from available studies might be fortuitous, even presumptuous. Within a few years, however, the influence of psychologist Jean Piaget began to be felt in North America. His experiments were repeatedly replicated with consistently similar results. Of particular note were his stages of cognitive development in the child. His "period of concrete operations" suggested that the child's cognitive ability usually flowered into maturity somewhere between age 7 or 8 and age 11, sometimes later. It appeared that until this maturity was reached, the child would not be able to bring consistency to abstract reasoning. In other words, he was not yet fully reason-able.

It could be logically hypothesized that since both the vision and hearing apparatuses--primary tools of learning--are literally extensions of the brain, they may be limited to the time parameters of brain development. On the other hand, a sound quality of abstract reasoning would be necessary if the child were to bring full and satisfying meaning to academic-type learning such as reading and arithmetic.

There was clinical evidence that 5- and 6-year-olds, and even some of age 7, had difficulty reading without considerable frustration and with more than rote meaning. This was especially true with boys. Furthermore, clinical observation suggested that vision and intersensory perception were problems for typical 5- and 6-year-old readers. They would stumble along, using their fingers to guide their eyes across reading lines. But seldom if ever were 8- or 9-year-olds seen doing this unless they had been habituated to it from their earlier years.

Normal children,frustrated with their inability to read with understanding, sometimes turned away from reading. Many others, excited at first with the prospect of school, lost their motivation after a struggle with tasks beyond their years, and by grade four they had developed an apathy toward school from which they were seldom aroused. Investigation revealed that this experience was common in elementary schools.

A combination of reports on neurophysiology and cognition and clinical experience in developmental psychology and remedial reading led a team at the Hewitt Research Center to explore the possibility of a correlational study in neurophysiology and cognition. A study was tentatively designed in which neurophysiologists on the one hand and learning psychologists on the other would independently study common groups of young children from ages 3 to 9. Correlation of their findings was to be made by an independent team of biostatisticians.

Specialists at the National Institute of Child Health and Human Development expressed an interest in the proposal, but noted that there was still considerable skepticism about the accuracy of the EEG measures so vital to such a study. They nevertheless agreed that the project was of sufficient importance that funding should be pursued for a pilot project. They recommended as a prospective investigator David Metcalf, University of Colorado Medical School child psychiatrist and EEG specialist. It turned out that Dr. Metcalf, well-known as a creative but conservative researcher, was vitally interested in the project and willing to undertake it even at personal sacrifice.

By the time the services of Dr. Metcalf were secured, a Hewitt-funded literature search necessary for such a study was already well advanced. The search and analysis of studies in cognition and neurophysiology (including vision, hearing, intersensory perception, and other sensory-motor areas) led to an interest in related areas and opened new horizons. These included social development and affective areas, such as maternal attachment and parental attitudes, comparative school entrance-age studies, and comparative cost-effectiveness of preschool and day-care intervention, vis-a-vis parent education in the home.

In 1971 a sense of urgency arose relative to early childhood education (ECE) issues because of the proposed federal early childhood legislation--Javits, Mondale, Brademas et al. Much of the effort on the part of these legislators was most laudable, but some of the preschool and day-care provisions appeared inconsistent with findings on neurophysiology, cognition and parental attachment. A number of state efforts were also of concern. Research appeared to be ignored or misused at times. The California state school superintendent had gone so far as to declare that the concept of school readiness was now outmoded--a statement that from almost any point of view seemed unwise.

Because of urgent legislative needs and on the advice of several consultants, the Hewitt Research Center published a preliminary report of trends and issues in ECE which was conclusive in several respects, although far from exhaustive. With the additional counsel of several distinguished developmental and learning psychologists, an advocacy position was taken in a HARPER'S article (Moore & Moon, July, 1972). According to the magazine staff this resulted in more letters to the editors than any other article in their history, indicating a high degree of concern and agitation about this topic. About the same time, a documented report was published in the PHI DELTA KAPPAN (Moore, Moon & Moore, June, 1972) with three guest editorials--pro, con and indifferent.

In June, 1973, the Office of Economic Opportunity (now the Community Services Administration, HEW) made a grant to the Hewitt Research Center on the campus of Andrews University to facilitate a fuller literature review. Along with the literature review, three joint ECE basic research grants were also made to Hewitt for (1) a correlational pilot study on neurophysiology and cognition, at the University of Colorado Medical School, (2) a study of the rationale for state school entrance-age laws, conducted at Stanford University, and (3) an analytical study of relevant data from the National Elementary School Survey.

All four projects were based on the premise that research and practice must work together if they are to be of any real benefit to society. There must be a common ground of testing communication and of interrelating theory and fact for which researchers themselves have a substantial responsibility. In an attempt to meet this obligation the following guidelines were established for evaluating both research and theoretical literature.

1. Research analysts and consultants may hold divergent views, but they must have prime concern for the welfare of children, with integrity and competence in the field.

2. A simple, clear interpretation should be sought in analyzing any data. Simplicity in reporting findings is not necessarily simplistic. Some of the finest pieces of ECE research have been found hidden in heavy tomes obscured by professional language and statistical anomalies. Every researcher or analyst who produces quality work should feel obligated not only to report data in a technically correct manner, but also to translate it into the language of the common man. Otherwise, very little interdisciplinary understanding occurs.

3. Sharing of findings in the various disciplines is a desperate need. This is practiced by many scholars. Yet some outstanding vision specialists, noted for their careful research, have been quite unaware of a child's affective needs,

and others have apparently not observed the extremely close relationship of vision and hearing to appropriate school performance. Developmental specialists have sometimes concentrated so provincially on learning psychology or physiological factors that they have not related to the key implication of social-emotional facets for their own disciplines. It is primarily the interrelating of research in constituent ECE disciplines that gives substance to the following review.

4. There is need among ECE specialists for a systems orientation--a systematic view with goals clearly in mind. Toy manufacturers may promote their products, private preschool operators may lobby for voucher systems, and labor organizations may want more preschools to provide more jobs. These represent vested interests. But professionals should not be so restricted in viewpoint that they lose sight of the larger goal of optimum development for all children.

The entire ECE movement is sometimes interpreted from the viewpoint of the ghetto. The poor must have help, but groups in higher socioeconomic levels must not be left without benefit of scientific knowledge lest they, too, succumb to social and personal deterioration and fail to bear their share of society's load.

5. An area related to both items 2 and 4 is that of ECE semantics. When, for example, is a preschool different from nursery school, different from day care, different from kindergarten? At almost any ECE meeting two or three of these terms will be used synonymously. Yet others will insist on sharply discreet definitions. Such conflict is self-defeating for the ECE movement. Instead, why not keep flexible and, where necessary, work to resolve these differences with common understandings? All these terms apply to the period before regular schooling, and it may be that so-called preschool in its best form is closer to a typical definition of day care.

Likewise, what is the difference between disadvantaged or deprived? handicapped or impaired? We find in one state that children are never retarded, but only impaired. This is fine line talk. On the other hand, we can understand caution about use of such phrases as "lower class" as compared with "middle class." No one should be called low class. Low income or low socioeconomic status is not *ipso facto* low class, with the onerous nuance of those words.

6. The date of a study or paper does not necessarily make it good or bad. Despite this fact, many planners are critical of reviews which utilize findings that are not contemporary. Some are even doubtful of studies more than five or ten years old. To say the least, this is neither scholarly nor farsighted. Studies should be appraised on the basis of design and validity in terms of stated objectives, and of overall value to a field of knowledge. In fact, well-done studies that have withstood the erosion of time are among our scientific monuments. Some of the best experimentation in the area of reading reaches back several generations. Likewise, a number of excellent studies on school entrance age probe back decades.

7. A scientist or scholar may be criticized for becoming an advocate--whether pro or con on any issue. But if he is convinced of the truth of his position and does not clearly delineate it when faced with contrary practices, then who should do it? It is presumptuous to assume that somebody somehow will come along and happen to do the job. Indeed, what better test can there be of "truths" and scientific techniques than the challenge to advocacy?

8. The attitudes of scholars toward other scholars must be open, with a mutual willingness to examine findings. It may be that a scientist is entitled to envy or criticism of a colleague, but this is inappropriate when done at

the expense of children or human welfare in any respect. Scholars may demean their colleagues, sometimes in their own institutions, and then go on to overstate their own findings. Such attitudes in the educational-political realm of ECE may damage the entire ECE cause and destroy the benefits sought for children.

9. A careful analysis of data may lead to unexpected but noteworthy findings. Studies are usually designed to yield information about a specific problem, yet the data collected may also provide insights into related problems. For example, from an international study of achievement in arithmetic (Husén, 1967) an alert analyst observed that the earlier children went to school, the more negative were their attitudes toward school (Rohwer, 1971). Both Husén and his colleague, Robert Liljefors, confirmed this finding from this and later studies (Husen, 1972; Liljefors, 1974), although the research had been designed for another purpose.

Focus of the review. An examination of early childhood education literature must necessarily focus on specific aspects of the subject. Yet findings must be interrelated in broad and systematic context or erroneous conclusions and policies may be derived. The sheer quantity of theories, studies, demonstrations, projects and programs of all sorts that have appeared in the last decade have left even some serious students of early childhood in a confused daze. How, then, can busy parents, teachers or administrators be expected to find their way through such a literary morass? And on what basis can concerned citizens and legislators plan for the best possible opportunities for children to develop into happy, responsible and productive members of society?

Representative reviews have dealt with various aspects of child development and early learning (Hoffman & Hoffman, 1964, 1966; Hartup & Smothergill, 1967; Hartup, 1972; Caldwell & Ricciuti, 1973). While some of the same areas are examined here, the emphasis is on an organization and interrelation of literature that might suggest new answers to the perplexing questions in early childhood education today.

The specific purpose of this review is to examine those aspects of research and other literature that indicate demonstrable influences on learning in early childhood. Although some references to infancy and toddlerhood have been included to provide a proper perspective, the emphasis is on children's learning and education in the preschool and primary grades from about age 3 through 9 or 10.

In the mass of literature related to early childhood education, it would be impossible to identify all the factors that influence early learning. There are some things, however, that appear over and over again as major determinants of intellectual development. Other things emerge less often, but tend to cluster with related items so that the combined impact becomes an important factor.

Each of the specific areas reviewed here has been selected because it represents findings indicative of strong influences on early childhood learning. There is much work yet to be done, and it is quite likely that some major influences on early learning are scarcely recognized at the moment. But from a careful analysis of the literature, the factors that have been identified as major influences on learning in early childhood include:

1. The significant people in a child's life.
2. The nature of the material environment.

3. The interaction of people and the environment to provide opportunities for experience and exploration.

4. Values and self-esteem developed within the family and cultural context.

5. Physical, neurophysiological and cognitive development and maturation.

6. Human and environmental resources that help develop the potential of the whole child for learning and living.

The literature search. In 1972 the Hewitt Research Center conducted a broad investigation of approximately 3,000 sources in early childhood education research and other literature. From the wide range of areas examined, a synthesis of information was suggested for further study. Many literature reviews are limited in scope to analyses in a specific area so that in-depth treatment is possible, but the Hewitt investigation traced a single idea through many areas. The relationships observed in this method of study made it clear that there were dynamic interactions between the various aspects of early childhood development and learning.

The implications from this general investigation supported the need for a comprehensive review of research literature, theoretical viewpoints and well-documented reports indicating trends requiring further study. Consequently, an extensive project was launched to study literature relating the cognitive development of children to the factors of (1) family, (2) self, (3) culture and home environment, (4) development and maturation and (5) structured learning programs.

The search was initiated by examining existing reviews of early childhood literature to locate references that might relate to influences on early learning. The bibliographies of relevant items were then carefully checked for further sources. Articles published in professional and research journals since 1960 were systematically identified. Unpublished sources were made available by an Educational Resources Information Center (ERIC) search and annotated ERIC bibliographies. In addition, a large number of interested people provided clues to materials that might otherwise have been overlooked. And finally, qualified professionals in early childhood education, representing a wide spectrum of views, were selected as consultants to suggest further references and to critique the project.

These various sources yielded more than 7,000 studies and papers that were screened in selecting the literature to be reviewed. Approximately 1,000 items were eventually retained for analysis and categorized for the purposes of this review. A sincere attempt was made to review items representing all aspects of the problem, although it is quite possible that some definitive materials have not been included. Those which have been included present a picture of early childhood and learning that is not new or startling. It is the organization and integration of the areas that might clarify some of the current issues in early childhood education.

Scott (1972) cautions that much "research" in education fails to produce new information that can be used beyond the situation in which it is acquired. It is not safe to assume that methods yielding certain results in one place will have the same effect in other circumstances with different teachers and children. Situational variables are responsible for much evidence that suggests trends but does not provide hard data. In this review some single studies may be inconclusive by themselves. But when the findings of such studies, in concert with the findings of many other studies, all point toward the same trends, then the implications need to be examined.

In analyzing literature for facts and trends, and in pointing out relationships between facts and trends, a scholar is always obligated to maintain a regard for integrity and truth. To examine information honestly, a scholar must be alert for clues from any source that may lead to further knowledge. While recognizing the value of careful investigation, he must also recognize that much information is available which has not been adequately investigated, but which could add immeasurably to knowledge and understanding if its validity were tested.

Materials of this nature cannot be accepted as fact; rather, they suggest problems for further study. But to denigrate a possible truth because it does not agree with presently accepted knowledge is contrary to the nature of scholarship. Some of the trends identified in early childhood literature are provocative in this respect. The human variables are so complex, and the divergent opinions so many (often depending upon vested interests in a particular profession, or political or social policy), that the real influences on learning in early childhood may be obscured.

This review presents a challenge to early childhood scholars to reexamine the early childhood dilemma. It is not meant to outline a particular position (although it may appear to do so), nor to deal at length with theories developed by others. Nor is it limited strictly to research literature. The research that does appear, however, has been critically assessed for objectivity and documentation of findings.

The materials in this review came to light through a systematic search of diverse studies, reports, theories and hypotheses all tied together by a common denominator of influences on learning in early childhood. These influences are sometimes unmistakeably apparent, and sometimes so masked in the minutia of research detail that only the most perceptive scholars have paused to consider them.

This review represents a massive search for early childhood information, but it cannot be said to be complete. Thoughtful critics have suggested additional sources that might have been profitably analyzed. And already, since this manuscript was prepared, further sources have become available which cannot be included at this time. Some trends have been identified and the challenge for an open-minded search for further truth is left with those concerned enough to pursue it.

CHAPTER 1

THE EARLY CHILDHOOD PROBLEM

The current interest in programs for young children is a reflection of some major issues in society. Although there is widespread agreement that something must be done for the nation's children, there is much confusion as to what the real issues are. As a result, early childhood projects and demonstrations have proliferated across the country. Some appear highly successful in making healthier, happier children. The results of others are puzzling. After spending huge sums of money and tapping the resources of highly qualified people and organizations, many programs seem to have contributed little of lasting benefit to children. Yet gratifying progress has been made as, for example, in identifying problems in child health and nutrition.

A number of the questions concerning early childhood today are perplexing. Changes in the structure of society have often stranded children on islands of insecurity. The shift of the population toward urban centers with inner city crowding and poverty, a technological society with increased freedom for women, economic circumstances that seem to make it desirable or imperative for mothers to work outside the home, greater social acceptance of the breakup and restructuring of family units--all these conditions pose problems for early childhood, and demand adjustments which children cannot make by themselves.

So our children need help, desperately. In an attempt to remedy the situation, attention has been focused on almost every imaginable kind of program for the preschool years. For example, some have urged the need for day care only; others have stressed academic readiness. Some have sought to provide a warm, caring atmosphere; and some have been little more than custodial. Some have hoped to provide freer communication between social classes, while others have been concerned for care within those classes. Some have succeeded in bringing the child greater freedom; others have appeared to be confused about their goals.

Well-organized early childhood programs have made it possible for conscientious business and professional women to leave their children and pursue their work. On the other hand, welfare mothers have also been freed to work, although their earnings have often failed to equal the cost of their children's care at public expense. These programs for young children have been expected to provide the antidote for all the negative effects of poverty, ignorance, neglect, and general inability or indisposition on the part of adults to meet the needs of children.

But in spite of careful planning and large expenditures of funds, why have so many children in so many early education programs seemed to profit so little?

When children in some programs have made noticeable social and intellectual gains, why have these gains so often tended to disappear after a few years? These questions lead to an even more basic question: What factors present in the early childhood years are the common denominators of later accomplishment and satisfying personal development? Research is continually in progress and all the evidence is not yet in, but trends are appearing which might provide answers to these questions.

Early childhood as a field of study. To understand the early childhood issues adequately, it is necessary to consider not only current research, theories and practice, but also the history of early childhood as a field of study and the principles of child development. Since basic principles are viable over time and from culture to culture, they can provide a stable perspective for the examination of early childhood findings and theories.

McLean (1954) reported a brief history of 35 years of research in child development, and Anderson (1956) summarized the child development movement. Their historical data delineate the major emphases of child development studies from early in this century to the middle fifties. Anderson noted that a cataloging of facts is typical of the early stages of any life science. This cataloging of structures, functions and behaviors of the organism serves to locate problems and develop hypotheses for further study.

Although observation and cataloging of child behavior was done informally by several psychologists with their own children late in the last century, and studies of children's learning were pursued by Edward L. Thorndike, Robert S. Woodworth and Alfred Binet early in this century, the real impetus for studying children came after World War I. New measurement techniques had been developed during the war and hundreds of psychologists were ready to use them. People were concerned about the physical and mental defects that had been found in servicemen during the war. It was a logical time for beginning a systematic and organized investigation of the growth and development of children.

Studies of physical and psychological development emerged in a number of universities. Measurement of the physical growth of infants and children was begun by Bird T. Baldwin at the Iowa Child Welfare Research Station in 1917, by Arnold Gesell at Yale in the early twenties, and in growth studies by Walter F. Dearborn at Harvard and by Frank N. Freeman at Chicago, also in the early twenties. A monograph on the mental growth curves of normal and superior children was published by Baldwin in 1922. In 1916 Lewis M. Terman at Stanford began following the progress of gifted children.

Funds for research in child development and parent education were made available in 1926 by the Laura Spelman Rockefeller Memorial. As a result, institutes such as the Child Welfare Institute at Teachers College, Columbia University (1924), the Yale Psycho-Clinic (1926), the Iowa Child Welfare Research Station (1927), and Institutes of Child Welfare at Minnesota (1925), Toronto (1925) and California (1927) were organized for conducting research. In these institutes nursery schools were established where children--mostly from 2 to 5 years of age--might be observed and studied. There also appeared during the twenties other organizations devoted to the study of children, such as the Merrill-Palmer School in Detroit (1920) and the program in Child Development and Family Life at Cornell (1925).

The emphasis in the research was largely on measurement--measurement of physical and mental growth curves, of intelligence, language, and social behavior. Practically everything that could be measured at that time was measured and the results were compiled to give fairly accurate descriptions of children at the various stages of development.

The economic depression of the late twenties gave rise to a new focus in child study during the thirties. The effect of socioeconomic status and child care practices on the development of children were now of vital interest. Kurt Lewin's field theories of the relation of children to their environment and analyses of the family, of parent behavior and of the effects of deprivation were major trends in studies just prior to World War II. Longitudinal studies begun in the twenties were now yielding substantial data and child development as a scientific area for investigation was becoming more firmly established.

The research was interrupted by World War II, but when it was over new measurement techniques had again been developed. Whereas the measurements following World War I had focused on relatively concrete and observable variables, these new measurements spawned by a more complicated war turned attention to projective techniques and measurements of the less observable aspects of personality.

Thus during the early fifties the study of factors contributing to the development of the self received attention. The idea of the self-concept took on importance as something basic in human development. Much of the literature in this area, however, appeared later in the sixties.

In the late fifties, with the advent of the space age, the education and achievement of American children were suddenly challenged as inadequate by important and diverse individuals and groups. Within a few years interest in personal-social development was subordinated to an almost frantic analysis of cognitive functioning and intellectual achievement. Whereas going to school and learning had been considered a right and a privilege for all American children, it now seemed to be a duty in the minds of many educators and policy makers.

The study and measurement of children for the purpose of discovering how the human organism grows and develops in its various environments was still of interest to some. But this was greatly overshadowed by the new emphasis on ways and means to induce development, especially cognitive and social, at earlier and earlier ages. The thesis seemed to be that the more rapidly a child developed, the better would be the quality of performance throughout life. The question was not what happens to an individual in the normal process of growth and development, but how can society make happen what it thinks ought to be?

From an extensive analysis of intelligence and experience, Hunt (1961) concluded that environmental encounters might be governed "to achieve a substantially faster rate of intellectual development" during the early years of childhood that would eventually lead to "a substantially higher adult level of intellectual capacity." Hunt visualized environments that would promote a "self-directing interest and curiosity and genuine pleasure in intellectual activity" without the grim urgency of "pushing" children. He further noted that as each child's potential was maximized, individual differences in intellectual development would be increased rather than decreased.

Lip service was widely given to the welfare of children, but in the final analysis pragmatism too often replaced compassion. Teachers and child care workers felt the pressure from those in authority to make children produce. And why shouldn't children produce? Experimental research was showing that they could learn reading and some mathematical concepts relatively early. It seemed a great waste of human potential not to capitalize on such ability.

Of special concern were the children who were thought to be disadvantaged. Their environments seemed to limit the development of sensory awareness so that traditional learning was difficult. The obvious answer was to provide enriched environments with deliberate early sensory stimulation and exposure to basic concepts in reading and math. Such intervention was expected to help these children keep up with their more advantaged peers. Further benefits were available in child health and nutrition services and parent involvement was a key factor in many of the programs.

In 1965 the Head Start movement was born. Many college and university departments of child development shifted their goals from teaching and learning about children to developing curricula and teachers for the new preschools that were appearing everywhere. Several states considered legislation for making early schooling available to all children down to age 3 or 4, and California went so far as to propose that by the age of 8 all children should have mastered the basic tools of learning in reading, oral and written language, and arithmetic (California State Department of Education, 1972).

This was the status of early childhood education when evaluations of the effectiveness of these programs forced some analysts to ask if the long-range purposes of early schooling were really being accomplished. Research studies mounted as scholars went to work on the problem; and opinions, some reliable and some wishful, began appearing in popular and professional journals and in news media.

It was not a simple matter to sort out the many facets of the situation. There were proponents of the traditional school viewpoint--build a solid foundation and later learning will be more easily acquired. There were others who were concerned with social action policies and the economics of welfare. Employed and liberated women lobbied for child care programs, and teachers' federations were concerned as teaching jobs dwindled with a declining child population.

Legislative proposals became only stop-gap measures as political considerations became overpowering. The child's real needs were not clearly defined, although there was general agreement that families needed assistance as well as children. The major focus was centered on remedies rather than prevention--what to do with families and children in a damaged society rather than seeking the real cause of damage.

Then a series of thought-provoking articles appeared from various sources (White, 1968, 1969, 1973; Elkind, 1970; Rohwer, 1971; Moore, Moon & Moore, 1972; Schaefer, 1971, 1972a, 1973; Bronfenbrenner, 1973; Moore & Moore, 1973). The conclusions of these scholars were reached independently, but they expressed a similar concern. They questioned the wisdom of early preschool education for the masses of children. Some suggested that rather than removing children further from an already weakened family structure, the efforts of society might focus on strengthening families and educating parents to provide adequately for their children.

Research has been moving steadily forward. New studies have appeared and pertinent older ones have been examined with renewed interest. Startling new theories have been proposed by scholars in major universities. Some ways of dealing with children which were successful in the past have been found to be quite up-to-date and useful for the present. Perhaps the most important outcome, however, is the realization that children must be valued for what they _are_ and for their potential to _become_ rather than for what society can _force them to be_.

Summary. The structure of a technological society and the issues generated by that structure tend to disrupt the traditional patterns of child-rearing, leaving insecure children without the strong emotional anchor that develops from early experience in a firmly established social group. To deal adequately with this dilemma of early childhood, an understanding of the principles of child development is necessary.

A brief review of the history of child study in this century outlines the focus on societal issues, beginning with a concern for physical and mental defects which were revealed in servicemen during World War I. Physical and mental growth measures were emphasized in child study centers across the nation until the economic depression of the late twenties and early thirties posed a new problem--the effect of socioeconomic deprivation on child development.

The steady accumulation of data from current studies and from longitudinal studies begun in the twenties continued until research was interrupted by World War II. Again, specific problems within the society became apparent. This time attention was turned to measurements of personality, and the self-concept became recognized as something basic in human development.

The intellectural progress of American children became the central issue of child study when the advent of the space-age raised the question as to whether cognitive development was adequately fostered. In addition, analyses and studies relating early experience and intelligence gave rise to an assumption that the more rapidly a child developed intellectually, the better would be his performance throughout life.

Social problems of the sixties resulted in disadvantages for large segments of the population and emphasized the need of many children for adequate early experience. What was usually overlooked in the pursuit of intellectual growth, however, was the equally strong need for emotional security in a changing social structure. Even the frequent inclusion of families in programs for children was not a totally satisfactory solution. Rather than providing costly but inadequate programs for all children, parent education and efforts to strengthen the family unit were suggested as a more feasible alternative for coping with the dilemma of early childhood.

CHAPTER 2

THE ROLE OF PARENTS IN EARLY LEARNING

There is a current trend for young children to learn more and more about the world in which they live from people outside of their own family in an environment especially prepared for learning. Or they may learn from people who are not physically present but who appear in two-dimensional substance on a television screen. According to Yarrow (1973), "today's children are reared by more influences and by fewer significant persons." This trend must be examined in relation to the role of parents in early learning.

It is true that life in a technological culture is extremely complex and a child's family may not be able to teach him all he will eventually need in order to cope with it. It is also true, however, that acquiring the skills to live with technology will have little meaning if one has not first learned to live as a human being. Historically, this has been a major role of parents--to teach children in their early years that they have a place, a responsibility and a worthy future as individual persons in a society of human beings.

The importance of this function of parents and families for the strength of a society is apparent in both history and anthropology. An individual's heredity may be highly desirable or extremely doubtful. His environment may be good, bad or indifferent. But more basic than either of these is the "how" of dealing with hereditary influences and environmental factors (Anastasi, 1958). This "how" has traditionally been the domain of parents in the early years of infancy and childhood.

How a child will relate to people and to the world which they represent is still largely the result of interaction with parents or parent substitutes. It is this affective tie developed in close, stable association with a small primary group that makes it possible for a child to define himself as a person, separate but related to those around him. The evidence for this emerges in an exploration of the literature on attachment and dependency. Premature interference with this tie can threaten a child's stability and the satisfactory performance of his role in society.

The importance of this primary attachment is generally conceded, but there is some disagreement as to when the attachment process is completed. Whether or not the development of attachment extends beyond infancy is an important question for sound early childhood policy decisions.

Attachment and dependency. Some relatively recent reviews (Ainsworth, 1973; Yarrow & Pedersen, 1972) and a comprehensive discussion by theorist-researchers (Gewirtz, 1972a) provide an extensive background for examining attachment and dependency in human development. The growth of significant interpersonal relationships during the first year of life is generally considered of primary importance for all aspects of later development.

Although the constructs attachment and dependency are not synonymous, they are both centered around what Yarrow (1956, 1964, 1967) calls an "object relationship" or a "focused relationship." Yarrow and Pedersen (1972) define this as a relationship characterized by strong interdependence and intense affect. Bowlby (1965, 1969) and Ainsworth (1963, 1969) simply label a child's affectional tie to an adult, particularly to his mother, as "attachment." Other researchers (Gewirtz, 1965; J. L. & H. B. Gewirtz, 1965; H. B. & J. L. Gewirtz, 1969) have referred to a child's smiling, vocalizing, watching and crying in response to his caretaking environment as "key social behaviors" without limiting their meaning to a concept such as attachment or dependency.

In discussing similar phenomena among animals, Harlow and Zimmerman (1959) speak of an "affectional system" or "affectional attachment," while Scott (1960, 1963) uses the terms "primary social relationship," "primary bond" and "social attachment."

These labels all apply to behaviors which share some of the same origins but which may be quite different in purpose and function. To understand the real impact of infant-adult interaction and its potential for positive effects in later development, it is necessary to make a distinction between attachment and dependency.

Attachment has also been defined as an enduring affectional tie that an individual forms with another specific individual (Ainsworth, 1972, 1973). An attachment may change over time, but it is not transient. It may be a characteristic of all ages, infancy through adulthood, and it is essential for healthy development and emotional maturity. Attachment implies a discriminating social responsiveness in seeking proximity to one particular person. It is the result of learning by experience from a significant relationship and of being cognitively aware that a particular person exists even though not actually present (Ainsworth, 1972). It carries no connotations of immaturity at any age (Bell, 1975).

Strong early attachments aid in the development of perceptual discrimination (Yarrow, 1972) and sensorimotor intelligence (Bell, 1970). In Geber's study (1958) of Uganda infants, tribal children were strongly attached to their mothers and experienced almost constant interaction with them for the first 2 or 3 years of life. According to Geber, they were a part of all the mother's activities, and their early motor and intellectual development progressed rapidly. The African children showed a lively interest in test materials and maintained excellent personal-social relations with the tester, smiling and trying to communicate with her. By seven months of age African children were two or three months in advance of European children in adaptivitiy, response to language, personal-social relations and motor development, especially posture. Uganda infants brought up in the European way, left much of the time in cribs and cared for according to a schedule, tended to develop according to norms established for Western children.

While these evidences of early mental development do not necessarily correlate with later intelligence or achievement, they do point up the influence of attachments on learning. Attachments, warmth and loving care continue to affect learning all through early childhood and into the school years (Liddle & Rockwell, 1964; Saltz and Johnson, 1973).

Gewirtz (1972b, c) further refers to attachment as a directional force within an organism which controls behavior by the unique influences of one person. The strength and quality of this attachment is determined by the amount and kind of care given by the mother or caregiver (Ainsworth, 1973; Yarrow, 1972), and it is generally formed only with a single, consistent caregiver (Yarrow, 1972).

An attachment is an affectional bond that gives stability in a world full of uncertainties. The mother or mother-figure to which the child has become attached affords a safe base from which to explore the unknown, a place to which one can return when things "out there" become too threatening. Beyond the first year of life a well-established attachment contributes to a healthy independence (Yarrow, 1972). An emotional stability then evolves that makes it possible for a child to persevere in spite of frustrations (Gewirtz, 1972b), to stay with a task or problem until a goal is reached.

Dependency is not synonymous with attachment. In fact, these constructs are related only in that the mother or caregiver is the central figure in both systems (Sears, 1972). Dependency is transient and implies an emotional immaturity as the individual grows older (Ainsworth, 1972). It may be defined as the response to stimuli from any one of a class of persons (Ainsworth, 1972; Gewirtz, 1972b), or it may derive from a lack in parental responsiveness during a child's infancy (McGurk & Lewis, 1972). Dependency originates in the infant's dependence on its mother and adult caregivers and may be defined as a set of behaviors that denote helplessness. This is natural in infancy. It is age appropriate behavior, however, and should decrease with time in the course of normal development (Bell, 1975).

Gewirtz refers to dependency as a class of learned behaviors which come under the control of stimuli from a class of persons. This occasions different sets of responses from interaction with different kinds of people. The child must then sort out what is acceptable behavior and what can be expected from interpersonal relationships that are frequently changing. In dependency nothing is sure. The people on whom one is dependent all have different expectations, so problems are met with routine, adaptive responses of low or moderate intensity (Gewirtz, 1972b). Relationships are diffused (Gewirtz, 1972c), and reassurance is sought by seeking help, attention, admiration and approval from any person available (Ainsworth, 1972; Gewirtz, 1972c; Sears, 1972). Bowlby (1965) calls it a "cheerful undiscriminating friendliness" with a "shallow attachment to any adult within the child's orbit." According to Bowlby, such children are extremely insecure and tend to go to pieces when they must function outside a structured environment.

Gewirtz (1972b) suggests that attachment may be a form of dependency which comes under the control of stimuli from one person, or very few other persons. Help-seeking or attention-seeking which results from a diffusion of caregivers, however, is termed socio-emotional dependency and should not be confused with a normal dependence on others for assistance that is really required in ongoing activities. This latter type of dependency is purely instrumental and is used constructively in a great many social interactions.

The origin of attachment and dependency behaviors is rooted in qualitative differences in the mother-child relationship. These differences not only affect the development of attachment but also influence, during the first year of life, the development of the cognitive capacity to grasp the concept of person-permanence, to realize that persons still exist as separate entities even when the child cannot see or hear them. Infants with a secure attachment to the mother have been observed to be more advanced in this concept than infants with a disharmonious mother-attachment (Bell, 1970). At first, the biological status of mother and child determines the nature and type of interaction between them. Recurring interaction sequences in feeding, transporting, etc., lead to mutual response patterns and the basis for an attachment is formed (Cairns, 1972).

The best place for acquiring a healthy attachment appears to be a healthy family environment. A child will learn to respond to some extent to all the people who appear consistently within the family, but his primary attachment will be to the one or two who give him the most care. Even when that care is lacking in some things that are usually considered essential, there is at present no known substitute for the family for developing a healthy attachment in children (Ainsworth, 1973).

An attachment that assures stability for the child also makes it possible for him eventually to be separated from the attachment-figure without too great a protest, especially as he acquires experience and becomes cognitively able to handle the fact of separation. Spelke and colleagues (1973) found that the intensity of an attachment was not reflected in a child's crying when separated from his parent. It seemed that a child was more likely to protest separation when interaction with a parent, in this case with fathers, had been limited. Children who had had frequent interactions with both parents were able to accept the separation with the least upset. It was suggested that children who interacted frequently with both parents had a greater variety of experience in a stable environment and were, therefore, cognitively precocious. This enabled them to accept the fact of separation with more assurance. On the other hand, children with minimal interaction with parents cried the most when separated from them.

Children 2 to 3 years of age who can accept separation with equanimity, however, may show distress when they discover that they are alone in a strange situation (Gershaw & Schwarz, 1971). They still need the assurance that they can return to a stable attachment-figure whenever necessary.

Although cognitive awareness enables a child to handle the fact of separation, it does not follow that there will be no emotional effect on an older child. When children 13 to 15 months and 2 to 3 years of age were observed in a strange situation, both in the presence and absence of their mothers, the constant presence of the mother appeared more necessary for normal behavior with the younger ones. The older children also reacted to the mother's absence, by a decrease in activity and by crying, but they recovered completely in a shorter time than the younger children when the mother returned (Cox & Campbell, 1968).

In the Cox and Campbell study the mother was absent for only a few minutes. There are other studies showing the negative effects of total separation on children in institutions (Bowlby, 1953, 1965, 1967, 1969, 1973; Skeels, 1966; Theis, 1924). In an intermediate area, Blehar (1974) studied the effects of long, daily separations in a day-care situation. She found that there were possible disturbances in attachment and separation distress, and these were a function of the age of the child at the time day care began. Children who began day care at 25 months tended to exhibit a massive detachment. Those who started day care later, at 35 months, maintained their attachment but it was an anxious attachment. It would seem that they were still in need of reassurance from an attachment-figure.

Bowlby (1965) has concluded that most children are not really able to tolerate separation from their mothers before the age of five. After that, a child who is happy and secure in his mother's love will not be unbearably anxious if the separation is not prolonged. But, Bowlby observes, children aged 5 to 8 who are insecure, doubtful of their mother's feelings toward them and "liable to emotional troubles, can easily be made far worse by a separation experience." They often believe that they have been sent away for naughtiness. This in turn leads to anxiety and hatred which results in a vicious cycle in parent-child relationships. Bowlby (1969) states further that "throughout the latency of an ordinary child, attachment behavior continues as a dominant strand in his life." It is only as adolescence approaches that this attachment to parents begins to weaken.

The stress of separation from an attachment-figure is frequently intensified by an accompanying change in the environment (Yarrow, 1961). For a very young child this strangeness and unpredictability in his surroundings may be as traumatic as the separation itself. Even for older children such novelty and unpredictability heightens the loss of the attachment-figure (Yarrow, 1964).

Just how an early attachment affects behavior at later ages is not yet clear, but according to Ainsworth (1972) clinical evidence suggests that significant relationships exist. The deprivation resulting from a lack of attachment may occur at any social level (Ainsworth, 1973), in affluent as well as disadvantaged homes. Ainsworth also says that even the best of day care cannot completely neutralize the effects of mother-child disharmony. The responsibility rests ultimately with the parents, the ones with whom children form their primary attachments.

When parents actively dislike or are indifferent to their children, then perhaps there might be an advantage in placing these children with substitute parents. Lewis (1954) noted that some children gained rather than lost from such separations. Yarrow (1964) also believes that a child might be removed from "grossly inadequate parents in a depriving and hostile environment." But Yarrow states further that everything possible should first be done to improve the family situation or the children should be given temporary care in their own homes.

Parent attitudes. The same environmental circumstances that contribute to permanence or non-permanence in a child's life also have some influence on parents' attitudes toward children. For the most part, however, parent attitudes are more deeply rooted in events, customs and personal experiences in their own life history.

An example of an attitude that seems to be associated with early parent-child interaction appeared in a study of the effect of hospital practices on later maternal behavior. Mothers who were permitted sixteen hours of additional contact with their infants beyond what was normally experienced while in the hospital showed an attitude of greater interest and concern for their children than mothers in a control group when interviewed a month later (Klaus et al., 1972).

Another group of mothers, whose children were left in an intensive care nursery for longer than two weeks because of low birth weight, gave evidence of attitudes related to personality traits rather than to the circumstances of birth and early interaction. Records of these mothers' visiting patterns during the infants' hospital stay showed that disorders in mothering behavior occurred exclusively among mothers with an attitude of little interest toward their child. These mothers visited their infants infrequently--fewer than three times during a two-week period. Mothers who visited their infants more than three times in a two-week period gave no evidence of disorders in spite of the lack of parent-child contact (Fanaroff, Kennell, Klaus, 1972).

It is quite clear that most parents' attitudes have accumulated from the environments in which they have lived and from association with a great many people and influences. Thus the family, education, religious institutions, the public media, the economy and prevailing status symbols all have their effect on how a parent perceives his child and what he expects that child to be. These attitudes, in turn, influence the quality of a child's motivation to become, especially as an attachment is formed.

Out of the milieu of social and economic forces parents have distilled their own beliefs that shape the future of their children. Mayeske (1972) concluded on the basis of comprehensive data from public schools in the United States that children's motivation for learning is primarily social in nature and origin, and the beliefs and aspirations of parents are a greater influence on school achievement than social status or economic well-being.

There are differences in the learning and achievement of children with different socioeconomic backgrounds, but these appear to be more a function of the attitudes of parents and of aspects of the lifestyle that are not entirely dependent on economic factors. For instance, the results of an investigation (Brophy, 1970) of the way in which mothers attached meaning to their own and their children's behavior in a mother-teaching task implied that the greatest differences among socioeconomic groups in stimulating their children to learn were in the areas of guidance and enrichment.

Brandis and Bernstein (1974) cite studies which show that parents of middle and lower socioeconomic status differ significantly in their attitudes concerning the adjustment of their children to school and differ in the preparation of their children for school. They also differ in their attitudes toward work and play and toward the use of toys by their children. There are major differences between the social classes regarding the value of books and reading, and this is apparently related to learning abilities. In all of these aspects, a child from a low socioeconomic level is usually at a decided disadvantage when compared with middle-class children.

McCandless (1967) noted that an effective environment for a child was one that could be actually experienced. Even though a child may be surrounded by stimulating toys and materials, he may lack the stimulation to learn when things are beyond his ability to experience. A simple but organized environment to which a child can actively relate probably provides the greatest stimulation for learning. For this reason, poverty level-homes provide as much stimulation for children as those that are more affluent, especially when activities are experienced in a satisfying relationship with a parent or other adult. The family and home influence is more likely to be a better predictor of educational functioning than socioeconomic status (Krus & Rubin, 1974).

Many low-income parents, however, have educational and occupational aspirations for their children equal to those in higher income groups. And they strongly believe that they have a responsibility for their children's learning (Levenstein, 1971). But they, and parents of other socioeconomic levels as well, need help to know how to proceed. As suggested by McCandless, parents need to develop attitudes related to the value and use of the simple things available to them. And above all, they need positive attitudes about their own worth as parents and the effect of their interaction with their children.

Mothers in low socioeconomic status groups sometimes feel that they have little influence on the development of their children. They may see themselves as powerless and unable to change things (Minuchin et al., 1967). The attitude of parents toward such a simple thing as talking to a child may set the stage for positive or negative development in the future. Weikart and Lambie (1969) found that some low-income mothers considered talking to a baby silly and unimportant. Failure to understand that infants can communicate with other people and can express definite emotions can result in a lack of maternal stimulation that hinders cognitive development (Tulkin & Kagan, 1972).

Early mother-child interaction is an essential factor in the young child's language development, and the quality of this interaction affects profoundly his communication competence. A child responds to communication before he understands words. His mother shapes his information processing strategies and influences his future mental growth and personality development through her linguistic and regulatory behavior. If this mother-child relationship is inadequate or incomplete, the child's language development may be retarded (Weininger, 1975a). The influence of sociolinguistics on the learning of the young child is emphasized by Brandis and Bernstein (1974) who found that the measure of reported communication and control by the mother before the child goes to school shows an increasing relationship to the teacher's judgment of the verbal behavior of the child at the end of his second school year.

When parents are themselves frustrated and apathetic, when life is unrewarding and apparently futile, there is a tendency to be satisfied with a low level of child care. In a study of Appalachian mountain mothers (Polansky et al., 1970) such feelings resulted in social withdrawal, lethargy and declining intelligence in children. In addition, impulsiveness in some of these mothers was linked with a way of life that made children hostile and defiant by the time they were 5 years old.

It must be emphasized, however, that parents of low socioeconomic status are not the only ones who can improve their attitudes in relation to their children's learning. Children from high and middle levels of society may suffer from the opposite extreme. They are sometimes under such tremendous pressure from their parents to achieve that they succeed academically at the expense of mental health. Some retain a life-long feeling of neurotic strain while others succumb to psychosis or severe neurosis (Levinson, 1961).

That children perceive the attitudes of their parents and behave accordingly is illustrated in the findings of Darvin Miller (1972). In this instance children's perceptions of their parents were significantly related to their social behavior in a nursery school. Parents who were perceived as accepting but firmly in control of things exerted this same assured influence on their children. These children exhibited positive social behaviors and a certain independence that might logically be associated with the security that comes from positive parental attitudes. Conversely, children who perceived their parents as punitive and/or over-indulgent tended to be dependent with negative social behavior.

In relation to learning, children's awareness of their parents' attitudes is closely linked to their intellectual development. The education and IQ of the mother seem to be less significant in this respect than the mother's attitude toward herself (Hess & Shipman, 1968) and her expression of maternal warmth (Levenstein, 1969; Radin, 1971). Radin, in fact, found that a child's ability even to respond to a compensatory program was greatly affected by maternal warmth.

Early learning in preschool boys who were observed with their fathers correlated definitely with father behaviors, particularly in relation to acceptance-type attitudes and restrictiveness. Boys gained significantly in IQ when fathers used reinforcement, consultation and sensitivity over a period of time. But boys whose desire to explore was apparently blocked by their fathers showed only limited cognitive growth (Radin, 1973).

Restrictiveness which limits exploration must be differentiated from the necessary limits imposed upon a child for his own safety and for protecting property and the rights of others. The security of knowing that there are limits with freedom to explore within them actually helps a child to achieve. Radin and Kamii (1965) discovered that it was this attitude in middle-class mothers that led to a high probability of their children's success in school. But the attitudes of low-income mothers tended to be self-defeating. They were protective, intrusive and controlling of their children with little respect for them as individuals (Minton, Kagan & Levine, 1971; Olmsted & Jester, 1972).

Similarly, Drews and Teahen (1957) found that mothers of high academic achievers were more authoritarian with their children than mothers of low achievers. Mothers of high achievers appeared to know what was best and their standards were accepted by their children. On the other hand, the more dominating, intrusive and coercive parental attitudes had a negative effect on children's apparent intelligence (Baldwin, Kalkorn & Breese, 1945; Hurley, 1959; Blum & Chagnon, 1967; Bercovici & Feshbach, 1973).

Child-rearing practices. Whether a child-rearing practice can be termed "good" or "bad" depends upon its contribution to the physical and psychological health of children as they grow up in their own particular culture. Basic early physical and psychological needs are much the same in every society, but are met with varying degrees of success according to the prevalent customs of child rearing (Stone & Church, 1973).

The most basic of these needs, summarized from Stone and Church, include (1) proper nutrition and the opportunity for physical development and health; (2) learning to communicate through language; (3) acquiring concepts basic to the organization of the culture—how to relate to time and space, using tools, expressing emotion, learning accepted behaviors; (4) identifying one's self as an individual, first in the family and later in the larger society; and (5) relating to reality, existence and the supernatural through religion or some metaphysical orientation. This latter aspect of child rearing is concerned with the inculcation of values, morals, ethics and attitudes regarding life and death, including sex conduct and the ultimate purpose of human existence.

In meeting needs that convey a heavy emotional impact involving personal identification, values, and the basic issues of life, the caregiver or parent exerts a strong influence. Spitz (1949) has said that this child-adult interchange is the central psycho-social factor in an infant's life. In areas of intense feeling the confidence and affection of the involved adults are more important than the actual child-rearing techniques. The maturity of the parents and their own psycho-social responses are the real factors in child-rearing success.

Firm, loving, demanding and understanding adults have been found to help children become self-reliant, self-controlled, competent, mature and buoyant (Baumrind, 1967). And the spontaneity of such children was not affected by even adversely high parental control. Baumrind noted that parents who were firm, but with punitive and unaffectionate attitudes, could affect their children adversely. Such children tended to be anxious, restless and alienated from their parents. Children of moderately loving parents who lacked control were dependent and immature. The unsureness in parental control was apparently reflected in unsureness of child behavior.

Spitz (1949) referred to a similar effect. Mothers with an infantile personality, shifting between hostility and overprotectiveness, had children who were slow to respond socially and were also slow in acquiring manipulative ability. The solution advocated by Spitz was education for parenthood, especially for mothers. He suggested that legislation be arranged so that mothers could stay with their children. But nearly twenty years later a study of child-care arrangements in the United States (Low & Spindler, 1968) showed a trend in the opposite direction. The number of mothers who found it necessary to arrange for the care of their children while they worked had steadily increased.

At the time of the Low and Spindler survey, 25% of all U. S. mothers living with their husbands and having preschool-age children were in the labor force. Twenty percent of the mothers living with their husbands and having children under 3 years of age were working. In addition, a great many widowed, divorced or separated mothers of young children were also working. This survey showed a clear trend in U. S. child-rearing practices to arrange for out-of-home child care.

But the employment of mothers is not the only reason for advocating out-of-home care. Those who are concerned about children's learning give a more pragmatic reason, especially for children from disadvantaged homes. Declining IQ scores among the disadvantaged seem to be related to the emotional effects of child-rearing conditions. Wiener, Rider and Oppel (1963) concluded that "something happened to lower class children after the age of 3 that was both emotionally disturbing and intellectually impairing." Their data suggested that child-rearing conditions were the cause, but the specific variables were not determined.

Nagera (1966) made a direct connection between early childhood emotional disturbances and certain child-rearing practices. He used the term *developmental interference* to refer to "whatever disturbs the typical unfolding of development." Unjustified demands made of a child in early and rigid toilet training, inflexible feeding routines and premature mother-child separation with lack of maternal stimulation were identified as having a potential negative emotional impact.

Aspects of child rearing that are entirely normal at the appropriate developmental level can become serious interferences when demands are made which the child cannot handle. Nagera noted that culturally determined interferences, such as behavior expected of children at a particular age, may be actively imposed upon a child without regard for individual development and needs. Because of differences in individual rates of development, a demand made of one 5-year-old, for example, may be beyond the ability of another 5-year-old and may be totally inappropriate for a 3-year-old. These inappropriate demands disturb the normal course of development and eventually hinder rather than speed up the developmental process.

Interaction variables. The importance of parent-child interaction is evident in the literature related to early childhood learning. Certain of the variables that influence the effect of an interaction are (1) the degree and quality of the involvement of child and adult, (2) the autonomy or restrictiveness engendered by the interaction, and (3) the stability and firmness or indulgence on the part of the adult.

Children from stable homes with a considerable degree of contact with their mothers might be expected to form strong attachments. Little, Kenny, and Middleton (1973) found an interesting circumstance when relating this type of child-adult relationship to the development of IQ. A strong interaction with parents in stable homes was related to an increase in IQ over time. While children from less stable homes appeared, for some reason, to have higher IQ's at age 4, at the age of 7 the situation was reversed. Children from stable homes with many opportunities for interaction with their parents showed a significant rise in IQ, and those from unstable homes had a significant decrease in IQ. The stability of the home and contact with parents became increasingly important in producing cognitive gains as the children grew older.

Although a considerable amount of parent-child interaction appears to be desirable, smaller doses are better than none. Children 1 to 6 years of age living in an institution definitely benefited from part-time "mothering" by foster grandparents over a period of several years. A control group of institutionally reared children were given much general environmental stimulation. This was reasonably effective, but these children gained less in IQ than those who had "grandparents" and no special stimulation (Saltz & Johnson, 1973).

On the other hand, there may be too many adults who exercise authority over a child without sufficient interaction to develop a real attachment. This may be true when older siblings and other adults are present in the household and an unnecessary spirit of competition is generated in the home. Under these circumstances Abramson (1973) observed the expression of violence in fantasy by the child. According to Tulkin and Kagan (1972), children interacting with a number of adults other than their own mother may actually be less likely to explore and manipulate their environment in the home.

Bell (1971) has observed that the quality of exploratory behavior, which begins in infancy, is influenced by the quality of the mother-child interaction. This affects both the child's attachment to its mother and its early cognitive development. The cognitive and social development are intimately interrelated, and the mother-infant interaction influences both (Ainsworth & Bell, n.d.).

During the child's first eight months the maternal qualities of sensitivity and appropriate responses to infant signals were found by Bell (1971) to significantly affect all aspects of cognitive development. In the last quarter of the first year, and possibly thereafter, cognitive development is fostered by the same maternal role coupled with conditions that permit a child to explore its surroundings, to initiate action on the environment and to receive feedback on its actions. And the quality of this exploratory behavior stems from the mother-child relationship.

Variables in the quality of parent-child relationships that have been shown to have a positive effect on children include such things as acceptance (Miller, Darvin L., 1972), warmth (Levenstein, 1969; Radin, 1971), happiness (Milner, 1951), expression of affection (Milner, 1951; Baumrind, 1967), and firmness of control (Baumrind, 1967; Baumrind & Black, 1967; Drews & Teahen, 1957; Miller, Darveu L., 1972). All of these might well be an integral part of happiness-inducing experiences. And, according to Milner (1951), the awareness of hapiness-inducing experiences in parent-child interactions was a characteristic of children with high mental maturity scores.

An investigation by Roff (1971) of specific factors in parent-child relationships that were predictive of adult neurosis pointed heavily to aspects of the interaction that were quite the opposite of these happiness-inducing qualities. The families of neurotics were differentiated from other families mostly in subtleties of parent-child interaction. Adult subjects reported they had experienced in their childhood parental neglect or repudiation and lack of affection. Some parents were reported as having desired riddance of the child and as having exhibited vigorous physical violence. There is strong indication that adults largely determine child behavior by the quality of the interaction which they build. This is clearly implied in Bronfenbrenner's (1973) discussion of the social ecology of human development

Parents' responsibility. To assure positive conditions and motivation for their children's learning, the first responsibility of parents is to themselves. Hess (1969) sought to identify the things mothers could do that would develop cognitive ability and educability in their children, even in poor environments. He concluded that the mother's own behavior and cultural background was the influential factor. Although mothers' backgrounds could not be changed, mothers could form attitudes that had a great influence on their children's emotional and physical environment, even in extremely limited circumstances.

Regardless of social class, parents can be helped to use their own abilities as parents and as their children's earliest teachers. Miller (1969) found differences related to social class in the teaching effectiveness of mothers largely because of differences in their teaching styles. In all social classes he found that mothers used varying degrees of specificity in communicating with their children, but mothers in the lower socioeconomic levels tended to be less specific and precise, conveying a more passive attitude. This tended to have a negative effect on their children's cognitive development.

From work with disadvantaged children, both black and white, Liddle and Rockwell (1964) asserted that the most important learnings in life began in the family. When children lacked loving care they were unprepared to succeed in a traditional school situation. According to Liddle and Rockwell, such children may have had no idea what education was all about or why they were in school, and it was difficult to achieve when expectations were not clear.

Schaefer (1972b) observed that children model parents in attitudes, moral knowledge, vocational interests, and personality. This suggests that the influence of parents on children is greater than that of teachers. A logical conclusion would be that teachers should work to effect desired changes by teaching the parents and trusting them to develop in their children the attitudes and motivations necessary for learning.

On the basis of literature reviewed, Schaefer reached the conclusion that parents must be taught skills for educating their own children in their early years. Gordon (1971) recognized that the "overwhelming influence of deleterious life circumstances" can be a real obstacle for parents who are willing to assume the responsibility for their children's early learning. These parents need help in mobilizing their own potential and that of their environment to meet the developmental needs of their children.

Schoolroom assistance by parents is not the same as their direct interaction and teaching of their children themselves (Hess et al., 1971). Nor are ignorance and poor attitudes effectively remedied simply by involving parents in school-home programs for their children. This was strongly suggested by a follow-up study of mothers involved in Head Start programs (Clarizio, 1968). Parents need more than participation in their children's educational activities. They need education themselves, education showing them how they can be effective influences in their children's development.

The preponderance of evidence indicates that the key role of a parent throughout the years of childhood is simply to be the kind of person to whom a child can safely become attached. Early development and learning are actively dependent on this relationship. Parents are chiefly responsible for a child's early learning by their attitudes and responses to the child in frequent interactions. There is a conspicuous dearth of evidence to show that this role can be successfully assumed by anyone else except by parent surrogates or attachment figures who become very much involved with a child on a relatively permanent, continuous and consistent basis.

Summary. The development in close association with a primary group of an affective tie, or attachment, provides a child with the personal stability to perform a satisfactory role in society. This basic emotional attachment results primarily from the interaction of a child with its parents or parent substitutes. A healthy attachment contributes to security; on the other hand, insecurity and emotional dependency are associated with too many unpredictables in a child's environment and frequent change of adult figures.

The greater the security of the child, the more capable it is of tolerating separation from its attachment figure. A child's separation tolerance also increases with age, both for acceptance of the fact of separation and for the length of separation.

Children are perceptive of the attitudes of their parents and tend to structure their behavior in accordance with the beliefs and aspirations their parents have for them. A child's motivation for learning, which is primarily social in nature and origin, is influenced more by the attitudes of its parents than by social status or economic advantages.

Culturally determined child-rearing practices may also interfere with a child's development and learning when such practices are actively imposed at an inappropriate developmental level, and demands are made which a child cannot adequately handle.

Parents have a primary responsibility to educate themselves for parenting and to make themselves into the kind of people their children can safely model. Parents who have learned to mobilize their own potential and that of their environment contribute to their own sense of security. They can influence positively their children's learning and personal development through the quality of child-adult interactions.

CHAPTER 3

VALUES AND THE SELF

The success or failure of academic learning appears to be influenced to a great extent by the concept of self (Brookover, Patterson & Thomas, 1962, 1964; Caplin, 1966; Brookover, 1969; Gill, 1969), and since self-awareness originates early in life (White, 1959; Farber, 1962; Coopersmith, 1967) it must be considered an integral part of early learning. Weininger (1975b) believes that the concept and awareness of oneself is related to body-image and that body-image seems to be a function of certain kinds of early experiences. These experiences include exploration of the body, masturbation, and wounds. The reaction of parents, particularly the mother, toward these experiences, is an important factor in the child's growing awareness of self (Brazelton, 1974).

The self-concept is also closely associated with value orientations (Wylie, 1961). In fact, the self and values are likely to have the same origins (Hoffman, 1963). Wylie notes that terms applied to self-esteem, such as self-respect and self-acceptance, also carry value connotations and are sometimes used interchangeably.

Values and the self are inextricably tied together. They are concurrent factors in their influence on learning. James (1890) recognized that personal values largely determine the worth attached to one's self, the measurement used in self-judgment and in evaluating personal achievement. Coopersmith (1967) defined the same synergism of values and self. He concluded that experiences are interpreted and modified according to the values and aspirations of the individual. If the individual lives up to his values he maintains high self-esteem. The values that interact with this achievement of self-esteem, however, do not represent objective, established data but are the personal values and convictions acquired by an individual through his unique life experiences. Thus a major task of early learning is the subconscious defining of the self and the identification of values which become the foundation for later learning.

Awareness of self. The earliest awakenings of the self as a separate entity originate from the quality of care and personal trustworthiness experienced by an infant through its caregivers (Erikson, 1950; Sullivan, 1953). It is upon this basic sense of identity that it later acquires a sense of being "all right," of being what other people expect it to be.

As experience accumulates and attachment to significant adults develops, the infant's awareness of itself as a person with an individual existence becomes more firmly established. Purkey (1970) states that during its first year a baby has found boundaries between its body and the outside world. It can discriminate "me" from the "not me" and attributes intention to the acts of others.

During the first few weeks of life a baby begins to sense its own worth in the awareness of others' appraisals as reflected by their felt responses. Approval, warmth and affection carry the message that it is wanted, loved, a valued individual. Or hostility, coldness and disapproval give rise to feelings of negative worth, of being unwanted and of little value. There is considerable support for the critical role of parents in establishing a sense of worth in a child (Manis, 1958; Davidson & Lang, 1960; Shaw & Dutton, 1965; Meyers, 1966; Coopersmith, 1967).

A parent whose own sense of worth is well established will, of course, find it easier to transmit a positive self-concept to his child. Farber (1962) suggested that parents' acceptance of each other as worthwhile persons will also influence the acceptance they provide for their children. And it is only as a child perceives himself accepted for what he is that a positive sense of worth can flourish.

That a child's self-concept bears some relation to the parents' self-esteem and concomitant attitudes has been shown by Tocco and Bridges (1973). Mothers from a deprived level of society representing black, white and Indian ethnic groups had a definite influence on their children according to their level of self-esteem and their view of teachers and schools. Mothers with high self-esteem had a more positive view of their children, of teachers and of schools. Their children, likewise, had high self-esteem and a positive attitude toward school.

The findings of Bledsoe (1967) indicated that boys generally have a more difficult time establishing self-esteem than do girls. Bledsoe found elementary school boys to be significantly lower than girls in self-concept scores, and these scores correlated with both IQ and achievement for the boys but not for the girls. It may be that girls desire more social approval than boys, and respond to measuring instruments in a way that produces error variance rather than genuine measures of self-concept.

Girona (1972) provides support for the idea that personality variables related to self-esteem may be influenced by emotional involvement with significant adult figures. For 10 weekends college students carried out special activities on a one-to-one basis with 6- to 9-year-old children from an institution. The children showed a progressive increase in sense of worth and willingness to assume responsibilities. The interest and attention of the college students also effected positive changes in the children's intelligence scores and lessened their dependent need for nurturance.

Awareness of values. Children learn best by example, and become aware of values as they become aware of themselves, by interacting with significant people in their lives. Parents with a firmly based system of values can provide a strong foundation upon which children can be free to build their own value structures.

Allen (1958) concluded that parents with a sense of va[illegible] do not find it necessary to immortalize themselves in their children. [illegible] children who receive accepting and respectful treatment from their elders are far more likely to accept the values of their parents (Hoffman, 1963). This is essentially a restatement of the fact that the same conditions that produce high self-esteem, acceptance and regard as a person of worth, tend to produce stable and realistic values (Coopersmith, 1967).

The values of adults become apparent in their treatment of a child and the kind of behavior which they foster or permit. This, in turn, gives rise to some rudimentary values in the child, to an awareness that certain rewarding experiences contribute to the good-me while anxiety-producing, evidently forbidden behavior belongs to the bad-me. Then there are those aspects of life which one hardly dares admit to his conscious mind, experiences of such intense anxiety associated with "such awe, horror, loathing or dread" that they are relegated to a personification of not-me. These experiences are not clearly connected with cause-and-effect and remain relatively primitive as guides for organizing future behavior (Sullivan, 1953).

The good-me and the bad-me, however, can be well understood. From these concepts of himself a child begins to distinguish between right and wrong, to identify the values approved by the significant people in his life. In discussing a child's growth toward maturity, Neubauer (1956) says that a child absorbs the values of his family between the ages of 4 and 6. It is at this time that he begins to ask, "Who am I?" And he finds his first social identity within the family group.

Values, self and the primary group. Within the family group a child first learns that people need each other. He receives care, but he also learns that he can contribute to the care of others as he becomes capable of doing so and can cooperate in family endeavors (Jenkins, 1956). Interaction within a primary group of closely knit persons without deliberate or regular interference from other individuals or institutions gives the self an opportunity to develop and establishes more firmly for a child the values that govern the group.

Although family values are absorbed during the preschool years, there is evidence (Edwards, 1974) that the real understanding of these values increases with age. Indeed, the full understanding of the moral issues involved may not be attained until adolescence or later. Edwards found that children probably do not have a clear grasp of certain moral concepts before the age of 15.

The influence of the family, especially the mother, appears to be of prime importance in establishing and maintaining values and the associated self. In the Edwards study, which included 700 children aged 7 to 15, the influence of the mother in the acquisition of moral knowledge increased as the children grew older. This primary group influence was not supplanted by the peer group, even into the teen years, as had been expected.

Although family values are dominant in a child's pattern of beliefs and behavior, these values may be so hazy in both articulation and practice that the child never knows for sure what they are. Or a child may absorb conflicting values from significant people in his early years if there is a low level of value agreement within the family. There could then be difficulty reconciling values as understanding increases. This is suggested by the findings of Van der Veen et al. (1964) in a study of the congruence of value orientations held by parents and the self-images of the family members.

Finding one's place in the peer group is a highly essential part of growing up in all cultures. This process of social identification outside the primary group, however, can be a threat to self-esteem when there is conflict between personal values and group values, as Coopersmith (1967) indicates. Most people judge their personal worth by values espoused by the group, and the social norms of the group become internalized as self-values.

Children are sometimes expected to function outside the family in a peer group before they fully comprehend their social identity within the primary group. Sweet and Thornburg (1971) found that age was a significant factor in preschoolers' understanding of the structure of the family and their own place in it. The older the children were, the better they could identify and understand familial labels and their own relation to them. White children did better than black children, but whether this was indicative of family structure or of communication ability was not determined.

The influence of the family, and of mothers in particular, has been reported by Webster (1965) to be related to those self-perceptions and aspirations associated with the tendency to achieve academically. These results were obtained with adolescents, but the family behaviors that led to them were identified as attention and support shown by mothers when the children were 6 to 10 years old. The greater the amount of this early attention, the more favorable were the youngsters' later self-perceptions.

The importance of a primary group which provides stability and acceptance that can be taken for granted by a child becomes clearer in the light of neurological data that indicate the difficulty small children have in "reprogramming" for new situations. Even though a child may know what he is supposed to do, he may be unable to master his actions because of genuine neurological inability to alter his response patterns for what are to him complicated verbal commands (Pontius, 1972).

Pontius suggests that this neurological inability to accommodate quickly if at all to unaccustomed circumstances normally exists up to four years of age, and for some children even longer. It could be much easier for the child if a familiar person were available to interpret the situation for him. Pontius finds here a basis for the behavior of some juvenile delinquents who under certain stressful conditions cannot act according to what they know they should do.

More than forty years ago Alexander and Staub (1931) were concerned with the early identification of behavior that might result in later delinquency. They referred to all children as potential delinquents if later socialization did not take place. Sometime between the ages of 4 and 6, they pointed out, the normal child begins to repress his non-social tendencies and transforms them into socially acceptable behavior by the time he reaches puberty.

Although delinquency is a complicated problem and there is no easy way to completely account for or predict it, children who fail to absorb and eventually internalize meaningful values and self-worth during these early childhood years are candidates for delinquency. Glueck and Glueck (1950, 1968, 1974) have reported a study of 500 delinquents who, in retrospect, were found to be slightly over 8 years of age on the average when maladaptive behavior was first apparent. Some had shown signs of delinquency even earlier in the first and second grades.

The Gluecks (1950) speak of "the child's first attempts to adjust to the codes and authority imposed by adults outside the home" as "the acid test of his social adaptability." If a child faces this test with amorphous values or before he is developmentally able to handle the testing of the self, the consequences could be disastrous.

Values, self and society. The time will inevitably come when a child must learn to adapt to the world outside the familiar boundaries of home and its immediate neighborhood. This may be an experience of eager exploration or of threatening anxiety, depending on the child's ability to meet the situation. If he is ready for it, his sense of self will expand as he accepts other people and embarks on a positive social adventure that will be surprisingly stable in the years to come. If he is not ready, he enters the larger social group with a personal identity handicap which is likely to remain through his future struggles to find and maintain his place in society.

Northway (1968) discovered that the sociometric status of children in nursery school and kindergarten corresponded very significantly to their sociometric status several years later in grade 5. There was some growth with increase in age,but the relative level of social status among peers was largely unchanged from nursery school through elementary school.

Since values and the self-concept are acquired in relation to significant adults, it is natural that in a new environment a child will find initial security by relating to the available adults, the authority figures who control his environment. A child who has matured enough to learn that he is a competent, worthwhile person is not threatened by these adults. He is not dependent on their approval. His experience is merely extended and his understanding enlarged by learning to know new people and places and ways of doing. He is better able to put new authority figures in perspective. He can meet the "acid test" of adaptability.

But for some children, adults in authority do pose a threat. Formaneck and Woog (1971) examined the perceptions of authority figures (father, policeman, teacher) held by preschool and elementary school children. The preschool children were considerably more threatened by authority than the elementary school children. Authority figures also were a greater threat to children of lower socioeconomic status, and teachers in particular were a greater threat to boys than to girls.

Kounin and Gump (1961) found that first-grade children who had punitive teachers tended to be unsettled in conduct and less trustful of school, less concerned with school-unique values. For first graders not yet completely sure of themselves and their values, punitive teachers exerted a negative influence.

Even as late as the sixth grade, children's self-esteem has been found to be affected by a teacher's perceived estimate of the child as revealed in teacher-assigned grades (Frerichs, 1971). This effect could extend into adolescence or later if a positive self-concept had not been established and if grades were considered to be an evidence of the teacher's evaluation of one's worth rather than an index of individual achievement. A positive self-concept, however, can leave an individual free to function independently of teachers' assessments.

Eventually, the self with its component values will be tested within the peer group. Where learning in the early childhood home environment has provided adequate ego-strength, the peer group experience will contribute to the development of a strong, autonomous moral character while children without strongly internalized values and standards may be vulnerable to peer pressures (Devereau, 1970).

Association with the peer group gives children the opportunity to see themselves in relation to others of their age. If self-esteem is high they can examine differences between themselves and others objectively. They can afford to be different because they sense their own worth. But when adequate ego-strength has not been developed, early association with a peer group seems to demand that individual characteristics be submerged in order to maintain self-esteem.

Peer group experience in a Head Start program for 4- to 7-year-olds was reported by Lamb et al. (1965) to produce positive changes in self-perception when measured by the children's tendency to see and maintain themselves as similar to others. A non-Head Start control group saw themselves as different from others and had a correspondingly lower self-esteem. Self-esteem in this study was apparently achieved by seeking to be like others and thus feeling accepted and approved. The authenticity of this "similar to others" type of self-esteem is open to question, however, in the light of some replicated studies with older disadvantaged children.

It has been assumed on the basis of conclusions by Ausubel and Ausubel (1963), Crovetto, Fischer and Boudreaux (1967), and Hawk (1967) that disadvantaged children are likely to have a low self-esteem. But Soares and Soares (1969) found higher self-perception scores among the disadvantaged in a study of public school children in a New England city. A similar study with a larger sample over a wider age-range (Soares and Soares, 1970-71) gave the same results--the self-concepts of disadvantaged children were higher than those of the advantaged. Purkey (1970), in commenting on the first Soares and Soares study, said that "it is likely that the emotional climate of the family is more important than economic or social factors and that the emotional press toward low self-esteem can exist in both advantaged and disadvantaged families."

Trowbridge (1969, 1970, 1972) reported much the same evidence as Soares and Soares. Again children from low socioeconomic groups showed higher self-concepts than more advantaged children. Trowbridge (1972) also noted that rural and small-town children scored higher than urban children. The Soares and the Trowbridge studies all examined children of about 9 to 14 years of age and found relatively higher self-concepts for lower class children than for others. The Lamb et al., (1965) and the Crovetto, Fischer and Boudreaux (1967) studies were concerned with preschoolers and found lower self-concepts for lower socioeconomic level children, except for those who were able to raise their self-concept as they learned to perceive themselves similar to others.

Radke, Trager, and Davis (1949) noted a sensitiveness in preschool and young schoolchildren toward membership in particular religious and social groups. The awareness that they were not like everybody else also affected their self-concepts. What appeared to be a low self-concept among these children seemed to be associated with their inability to cope with an environment different from that to which they were accustomed.

Age or maturity, satisfactory experiences and cultural variables all influence the development of the self for functioning in the larger society. Hess (1972) has identified here a problem of "how to socialize the young in a society where the system is not being very well maintained." Analyses of early childhood literature seem to point squarely to the need for developing in the young the values and self-worth necessary for social competence. But the traditional "system" for this job—early socialization in the family context– is being questioned.

In some respects children are socializing each other, gaining their values and sense of worth from an ever younger and more insecure peer group. Spitalny (1957) speaks of children as mirrors for each other. This could provide a positive experience in personal growth if the child's own sense of self were securely rooted in a stable family group. But very young children who have not yet internalized their own values can judge behavior only in terms of themselves and their limited experience. This is illustrated by a study of preschool children's leniency toward cheating (Ross and Ross, 1969) in which rule breakers became more lenient toward misdemeanors while conforming children became more severe.

Disturbing questions have emerged from examining the literature pertaining to values and the self. These questions center chiefly around the socializing agents of children, with grave implications for the future of society. How do children best acquire the values and positive self-esteem necessary for constructive growth? Are present socializing agents competent to give children what they need? If not, what changes does society need to make to insure for its children a worthy sense of self upon which they can base learning for constructive citizenship?

Summary. Values and the self are closely associated, and a major task of early childhood is the subconscious defining of the self and personal values. Children become aware of both themselves as persons and of values by interacting with significant people in their lives. Parents with their own values well established provide firm bases upon which children can be free to build their value structures. Such parents do not find it necessary to insist that their children accept parental values. But under these circumstances children are far more likely to accept their parents' values.

Basic values, whether clearly defined or ephemerally perceived, are absorbed from the primary family group during the preschool years, although a full understanding of values may not be attained until adolescence or later. These values are a part of one's personal identity and contribute to self-esteem.

A firmly established social identity and self-esteem within the family group make it possible to function outside this group with equanimity. But adjustment to codes of conduct and adult authority different from that of the family group can be a real threat to a child's self-esteem when personal values have not yet been internalized.

The socialization of children becomes a problem in a society where traditional values are questioned. When adults, and parents in particular, are unsure of their responsibilities, children may be left to socialize each other, to form their values from their own peer group with consequent insecurity and negative self-esteem.

CHAPTER 4

THE LEARNING ENVIRONMENT

The extent and meaning of learnings in early childhood are largely dependent on the people and things in a child's immediate environment. Much of the recent agitation about early learning is concerned with environmental deficits, especially among the poor and minority groups (Cole & Bruner, 1972). However, learning competence which is assessed only from the observed performance of individuals within any group is, as Cole and Bruner state, "both situation-blind and culture-blind."

Learning can evidently proceed under a variety of circumstances depending on the specific categorization of experiences within a culture (Tyler, 1970). So any attempt to describe an ideal learning environment must be made within an appropriate cultural framework. In the U.S.A. deficient environments are often assumed to be a factor when young children do not measure up to the learning standards of middle-class children

(Holmes & Holmes, 1966; Gill, Herdtner & Lough, 1968; Ball, 1970; Jordan, 1971; Stevenson, Williams & Coleman, 1971). But Cole and Bruner suggest that this may be a highly suspect criterion. They suggest that the organizational adequacy of any environment depends on whose point of view is used in categorizing familiar areas of experience.

On the other hand, studies of both animals (Denenberg, 1969; Weininger, 1956; Rosenzweig, Bennett & Diamond, 1972) and human infants (Honzik, 1967; Heber & Garber, 1970) indicate that some environmental factors do have an influence on basic learning achievement. These factors must be identified and, insofar as possible, be incorporated into a child's environment if learning competence is expected.

An atmosphere for learning. Basic learning involves a child's experience with his immediate surroundings (Caldwell, 1972). It includes information about the people and things that affect him and to which he has opportunity to respond. Shapiro and Biber (1972) regard this acquiring and ordering of information as encompassing the affective, social and cognitive aspects of a child's development. They believe that it is an integral part of the growth of personal and interpersonal processes such as self-esteem, sense of identity and relatedness to other people.

It appears that a prime requisite for an environment conducive to learning is the fostering of comprehensive interaction of the child with his environment. Of special importance is a climate of interpersonal responsiveness which creates an atmosphere that conveys personal acceptance and approval to the learner. The literature on parental attitudes (chapter 2) and self-awareness (chapter 3) in this review provides substantial support for this conclusion.

How personal approval contributes to an effective learning experience is illustrated by the responses of 5- and 6-year-old disadvantaged children to rewards for learning (Farber, 1970). In this study some children were rewarded for correct responses with candy and others with a verbal "Good, that's right." Those who received personal recognition instead of candy not only showed superior learning but also learned with fewer trials.

Unfortunately, however, the value of approval is not always appreciated and is often ignored. Teachers sometimes imply disapproval of a cultural heritage by expecting or even requiring children to perform according to standards that are inconsistent with their past (cultural) experience, and their differences become deprivations (Cole & Bruner, 1972). Teachers, especially the younger and less experienced, are frequently less tolerant of these differences than they should be. When elementary school teachers' attitudes toward child behavior were compared with those of clinical psychologists (Tolor, Scarpetti & Lane, 1967) it was found that the psychologists were more accepting and tolerant than the teachers. The more experienced teachers, however, were closer to the psychologists in their assessments. A variety of child behaviors considered normal by psychologists were generally termed pathological by inexperienced teachers. Teachers generally tended to regard almost all differentiating behavior as abnormal.

It is not surprising that learning becomes inhibited in an atmosphere of disapproval. A study of teachers' belief systems (Harvey et al., 1966) showed that teachers who were most willing to accept differences without negativism and who could interpret situations from a multidimensional point of view were clearly superior in producing educationally desirable atmospheres. Teachers who frequently expressed platitudes and normative beliefs, who could see things only in *their* way or who were otherwise inflexible, were much less successful in creating positive learning environments.

To become a competent individual a child must learn to deal effectively with his surroundings (Shapiro & Biber, 1972). But this is difficult if not impossible when he must cope with fear, uncertainty and confusion (Scarfe, 1972). A child from an unstable home or from less stable levels of society may indeed have a disadvantage. For example, Klaus and Gray (1968) identified a confused noise background as a hindrance to learning among some disadvantaged children. Such children have more difficulty concentrating and are more easily distracted in a learning situation (Conners, Schuette, & Goldman, 1967). Conners and his colleagues noted that this distractibility appeared less likely among 9- and 12-year-olds than among 5- and 6-year-olds, however.

Confusion may also exist relative to authority figures whether they be older siblings, other adults in the household, or teachers. When there is competition for a child's attention (Abramson, 1973) or excessive child interaction with a number of adults (Tulkin & Kagan, 1972), a child can become confused if authority is not clearly designated. Abramson observed negative aggression effects while Tulkin and Kagan found a limitation of opportunities to explore and to manipulate the environment.

Children of lower socioeconomic status (SES) are particularly vulnerable to these confusions. Although there may be numerous adults in the lives of middle and upper SES children, their learning is not so likely to suffer. But crowded living conditions at home and variant cultural values at school produce a confusion in the learning environment of the less affluent child that exists only minimally in the higher socio-economic levels.

When confusion of adult authority and/or values is eliminated, then adults can provide an assurance that makes it possible for a child to explore and organize his own environment. Collard (1971) found that lower and middle SES children explored about equally, although middle-class children seemed to have more opportunities for experiences around which to organize their discoveries. Collard also observed babies reared in an institution with one adult caregiver for every five babies. These babies gave evidence of insufficient adult attention and had less inclination to explore and fewer schemas for playing with a toy than the home-reared babies.

Honig, Caldwell and Tannenbaum (1970) observed that adults in a child's environment are of "overwhelming importance" for cognitive input, especially during the first four years of life. Even when children were surrounded by other children, they sought out an adult for informational transactions. A conclusion of this study was that any environment is deficient for learning if a child does not have easy--and friendly--access to an adult for information exchange.

Acceptance, approval and assurance born of a highly predictable environment all contribute to a positive atmosphere for learning. To these must be added freedom to explore the environment with whatever interest and challenge it offers. The animal study by Rosenzweig, Bennett and Diamond (1972) even implies enrichment in brain development when there is freedom to explore, particularly in a natural setting.

The freedom to manipulate actively the materials in one's immediate world helps develop a specific, concrete base for learning. In comparing economically advantaged and economically disadvantaged 5-year-olds, Kunz and Moyer (1969) found no relationship between the respective environments and children's physical skills, their attempts at problem solving or the length of sentences spoken in their own vocabularies. But the disadvantaged children showed a lack of experience with manipulative materials along with a difference in vocabulary and motor skills.

A relationship was also observed between manipulation of materials and learning by Wolff, Levin, and Llongobardi (1974). Kindergartners were tested who either produced or observed interactions between pairs of toys. Twenty-four hours later the children who had actively manipulated the toys re-paired significantly more items than those who had observed only.

This freedom to explore, to move and to manipulate helps children to learn not only about material things but also about themselves. Carpenter and Shipley (1962) describe it as an intellectual and emotional as well as physical experience. Freedom to explore encourages curiosity which leads to new encounters with both people and things, thus affording an ever-widening challenge for learning.

The interest aspect of a learning task may have much to do with the performance of the learner (Marshall, 1969). When children who had a poor educational environment, as determined by their area of residence and the education of their parents, were assigned a high interest, game-like task they learned as quickly as children from better educational environments. In this particular situation it was also observed that children from high-rated environments performed better without the game-like qualities that added the interest to the task. Marshall concluded that these game-indulged children could complete a dull task to get it over with. For them task interest needed to be inherent in the task itself.

The quality of motivation appears to be a transcending factor here. The "fun and games" conjured up to make learning appealing are evidently a pseudo-component of the atmosphere of learning, a gimmick that stimulates at the outset but soon palls. And bored, over-stimulated youngsters eventually become passive acquirers of information. Using videotapes that depicted and promoted social integration of black and white children, Colton (1972) found that kindergarten children from both integrated and all-white schools gained a significant number of concepts from viewing the tapes. But the passive viewing resulted in almost no active changes in social preferences relating to those of an opposite color.

There is also evidence that passive absorption of continual sensory stimulation actually reduces the arousal level and dulls responses (Jeffery, 1969). Brackbill (1973) found this to be true whether the stimulant was audio, visual, tactile or temperature. But Brackbill's most startling finding was that this reduced arousal remains relatively unchanged over time, not for just a few hours but for years. This dulling effect, however, was not apparent with intermittent stimulation.

In a technological culture children are often surrounded by mechanical noise, and television intrudes its visual stimulation of light and movement as well as sound. The findings of both Colton and Brackbill suggest that the real need in the learning environment of many children is for less constant exposure to external stimulation rather than more. In the early development of intelligence, over stimulation in the environment may be more detrimental than under stimulation (Wachs et al., 1967). The alternative to contrived stimulation would appear to be active, self-initiated exploration and discovery of a reasonably predictable environment (Carpenter & Shipley, 1962; Rosenzweig, Bennett & Diamond, 1972).

Thoughtful critics of early schooling (Elkind, 1970; Robinson, 1973; Rohwer, 1971, 1973, 1975) suggest that a child's opportunity to explore his environment at leisure is being jeopardized by measures that were meant to counteract environmental deficits. It seems that the laborious methods employed to inveigle children into learning lead eventually to the passivity and wearied boredom inferred by Marshall (1969), Colton (1972), and Brackbill (1973).

The redundancy in structured learning, the tedious repetition year after year of the same materials might very well inhibit a child's intellectual freedom to move and explore. And according to Carpenter and Shipley (1962) this could actually hold up learning. A concentrated research effort is needed to determine the relationship between initiative in learning and the degree of personal freedom for exploring a comfortable but challenging environment within well-defined limits. There are indications that much current stimulation in early childhood is, to use a metaphor from Ames and Chase (1974), a two-dimensional effort to force what should happen spontaneously as development and experience progress in a three-dimensional world.

Even verbal stimulation, so often considered fundamental to early learning, may not be as necessary as has been supposed for the development of basic learning ability. Cole and Bruner (1972) define verbal skills as "cultural amplifiers," useful for adapting to a culture. But there is apparently no real support for the assumed role of a specific language in the development of cognition. That is, a child's intellectual ability may in no way be impaired merely because he does not communicate in the commonly used language or according to a prescribed pattern (Dennis, 1942; Havighurst, Gunther, and Pratt, 1946; Vernon, 1965; Hooper, 1969; Rohwer et al., 1971).

The material environment. Although a learning environment may be materially limited, highly intelligent children may come from poor families. It is not being poor that limits learning but the apathy, the lack of initiative that sometimes accompanies poverty.

Initiative and achievement are not the prerogative of wealth nor of a particular culture. Families can provide a challenge for learning in quite diverse environments. Vernon (1965) concluded from a study of Jamaican, Eskimo and Indian boys that, in spite of linguistic handicaps, some of these children actually scored very well on tests of verbal intelligence and achievement. Vernon's results indicated that the most significant single influence in these various cultures was the quality of the home and family.

While active exploration and manipulation of materials is quite obviously essential for early learning, enriched environments alone do not necessarily improve cognitive and perceptual development (Busse et al., 1972). When six experimental preschool classrooms were provided with special equipment to facilitate learning, the enrichment did significantly alter the classroom environment. Yet there were no differences in verbal ability or auditory perception between the enriched children and six groups of children from ordinary classrooms. In fact, the control children showed greater gains in ability to perform intellectually and in visual perception. While enriched children came out ahead in visual sequential memory, they were surpassed by the controls in all other areas.

Busse and his colleagues concluded that a "properly" equipped preschool was not a panacea for the problems of disadvantaged children, and there can apparently be too much of a good thing. The greatest gains made by preschool children occurred without special equipment, which suggests that a simple, natural environment may be the optimum place for learning during the early years.

The same principles that govern learning in relation to structure and stimulation in the environment are also apparent in the effects of urban and rural settings. Children 7 to 9 years old from a farm community in Norway were found by Hollos and Cowan (1973) to do as well or better than village and town children on tests of logical operations, and their performance became markedly better with age. The 7-year-olds in this study were still preschoolers because of later school entrance-age laws in Norway, but this did not hinder their performance.

Although these Norwegian farm children were considered socially isolated and were limited in role-taking abilities, their general intellectual development had not been hindered. It was suggested that differences in ethics and values between the farm children and the other groups of children influenced their performance. Whatever the reason, language stimulation and schooling did not seem to play a major role in developing logical operations ability.

The question implied here is whether or not a more socially structured environment with material advantages can substitute for home-acquired ethics and values in providing sound learning experiences. There has been little empirical research on the incorporation of family value systems into children's thinking, but Hollos and Cowan's evidence suggests that children tend to make progress in learning if they come from homes which have clearly delineated value systems. Research is needed that clarifies the effect of family value systems on children's learning and the specific environments that foster the building of these values.

Studies dealing more specifically with the effects of schooling or lack of schooling on children's ability to learn produce the same results (Sigel & Mermelstein, 1965; Vernon, 1965; Goodnow & Bethon, 1966; Mermelstein & Shulman, 1967; Goodnow, 1968). It is apparently not so much the school environment that enables a child to learn in his early years, but what he brings to the school. And if there is no school, he can still develop the ability to learn. The evidence from these studies suggests that emphasis on attempts to structure an environment for learning is of lesser importance than the internal motivation which originates from the earliest consciousness of one's being--from family, home and the immediate cultural milieu.

The effects of culture on learning must be taken into account. According to Weininger (1975b) educators must develop a learning environment for children coming from various cultures. There must be a transitional period, a bridge, fashioned for the child by the classroom, in which he makes use in the school of experiences that he has had at home and which his culture has made possible, so that he does not enter school feeling alienated and valueless. Educators need to understand the environments from which children come, and they must create familiar learning environments so that children can build on whatever knowledge they have acquired from their home background and culture.

The home environment. As a place for early childhood learning, the home and its immediate neighborhood must be examined. For developing language and social skills, the home and neighborhood have been found to be as effective as carefully planned preschool experience. Vance (1967) reported such results from a comparison of two groups of preschool children. Children in a preschool program designed to improve the language and social skills of disadvantaged 3- and 4-year-olds had gained no more at the end of a seven-month period than children in a matched group of preschoolers who had remained at home. In another program low-income black mothers participated in activities at home with their own preschoolers (Greathouse, 1972). The results of this program indicated that more teaching and learning can occur in the home than had previously been assumed.

The earliest tactual, auditory and visual stimulation results in learning. According to the findings of a longitudinal study on the effects of the environment on mental growth (Honzik, 1967), this early sensory stimulation is best provided by the home and family. This agrees with the conclusion of Collard (1971) that home-reared infants received the greatest variety of stimulation from their environment because of social responses within the family, e.g., to the child's manipulation of materials and toys.

Holmes and Holmes (1966) also reached the conclusion that the home environment could have a significant influence on the learning of preschoolers. In a Head Start related study, children who consistently gave the highest evidence of learning were likely to have favorable home environments and parents who were interested in their development. The highest scores were made by middle SES children who were not even participants in the school program. Head

Start children with concerned parents scored next highest. Children who were sought out by Head Start personnel but whose parents were not especially interested made the lowest scores, regardless of participation in the program. Holmes and Holmes considered home environments that provided the stimulation necessary for learning as the differentiating factor among these children. Parental concern was a greater influence than the specific provisions of the material environment.

Similar findings occurred in work with elementary school children. Wolf (1964) examined relationships between the home environment and the general intelligence test scores of urban, suburban and rural children about 11 years old on the average. As with the younger children in the studies already cited, the home environment proved to be positively and significantly related to intelligence scores. The better the home, the more stability and interest it provides, the easier it is for children to learn, while disorganized and threatening homes tend to inhibit intellectual development.

When children from kindergarten through grade six, mostly black and from low-income families, received learning support at home they were able to achieve at a higher level in school (Smith, Mildred B., 1968). This home support included creating a climate conducive to study. Parents also read aloud to their children to stimulate interest in reading. And just having books and newspapers around was found to be supportive. Smith suggested that educators should be helping parents to assume these responsibilities for their children's education rather than expecting the school to take over the parents' roles. The school could not make up for what the home did not provide.

Children seem to learn best when they can relate to a warm, responsive adult. Yet Blank and Solomon (1969) found that mere personal involvement on the part of a nursery school teacher was not sufficient to produce significant cognitive change in the disadvantaged child. Even when a teacher worked with a child on a one-to-one basis, learning from a cognitive point of view was not successful for the low SES child without a structured teaching situation along with the teacher involvement. This seems to contradict studies showing the advantages of relatively unstructured environments. But in reality it is entirely consistent. It is the security of a healthy early attachment to a consistent adult that contributes to later emotional independence (Yarrow, 1972). For children who are insecure and socio-emotionally dependent (Gewirtz, 1972b), the structured situation described by Blank and Solomon provides an external security that fosters learning. But greater progress is fostered by the internal security of home and family that permits learning without deliberate structure (Holmes & Holmes, 1966).

Blank and Solomon also noted that in middle-class homes opportunities for adult-child verbal interchange came about "normally" and were not limited to short, set times. In lower income homes these opportunities were likely to be rare, and the relatively brief time spent with a teacher was not a satisfactory alternative. The personal lack in the home was identified as the cause of these children's difficulties in verbal skills and attention span, and maximum use of the time a child had with his teacher was deemed essential.

Disadvantaged children do have the potential to learn (Hooper, 1969; Rohwer et al., 1971), and the fostering of this potential can evidently be done by concentrating either (1) on a structured teaching environment for a certain time each day (Blank & Solomon, 1969), or (2) on a supportive home environment (Holmes & Holmes, 1966). For early childhood learning the structured teaching environment has limitations as noted by Busse et al. (1972) and Carpenter and Shipley (1962). But the home may be so lacking in supportive qualities that it will depress the child's morale and hinder learning achievements (Secord, 1967).

Litman (1969) discovered limited resources in both low and middle SES families. And she found that well-developed children could come from either crowded or spacious homes. It was the quality of the home that mattered most. Home environments that provide such opportunities as conversation among family members and reading by adults to the children (Jones, 1972) or simple materials and toys to manipulate (Levenstein & Levenstein, 1971; Greathouse, 1972) seem to stimulate early childhood learning more effectively than do the schools.

Influences of culture and society. Secord (1967) concluded that the types of experience a child has is determined by the culture in which he lives and this affects his attitudes and ambitions. Horowitz and Resenfeld (1966) found that persistent behavioral deficiencies appeared to be reversible in children whose experience had been limited by social conditions.

Culturally determined differences in experience and modes of thinking lead to differences in learning processes that make some children appear at a disadvantage whether they are or not. Stevenson, Williams and Coleman (1971) raised questions about comparisons based on average levels of performance among populations. They suggested that a more revealing approach would be comparing patterns of correlations among different learning tasks.

The ability to profit from previous experience and to recall previous learning was found by Rohwer et al. (1971) to be about equal for two groups with different social backgrounds--white children from a high socioeconomic level and black children from a low socioeconomic level. Variance in learning success for both groups was attributed to the manner in which learning materials were presented. When materials are relevant and meaningful and when they are presented in a way that can be understood (Stevenson, Williams & Coleman, 1971), learning can occur at all social levels (Pishkin & Willis, 1974).

A positive attitude toward school is also an asset for learning. Neale and Proshek (1967) found this was not necessarily a problem for culturally deprived children. Fourth to sixth graders from a culturally disadvantaged area placed a high value on school although they considered it something difficult to attain. Socioeconomic standing is of less consequence than is usually assumed in determining attitudes toward school, at least in the United States, according to Berk, Rose and Stewart (1970).

The cumulative results of these studies indicate that attitudes, purpose and appropriate process are the key contributors to learning success. When due consideration is given to these factors, children from supposedly deprived conditions seem to show an ability to learn which is in no way inferior to that of average American children (Dennis, 1942; Havighurst, Gunther & Pratt, 1946; Vernon, 1967; Hooper, 1969; Weber, 1971).

Learning and cultural imposition. The foregoing studies relating to the learning environment bring into perspective two distinct aspects of the problem. One has to do with the basic conditions that permit learning to occur, and the other is concerned with social and ethnic group differences in organizing experience and mind-hand relationships.

Cole and Bruner (1972) suggest that research involving cultural differences is of little benefit as long as one cultural system is assumed superior over another. When children of one social group seem to learn less readily than others, the source of the learning difficulty needs to be identified. It may be in the home environment (Holmes & Holmes, 1966; Klaus & Gray, 1968; Tulkin & Kagan, 1972), but it may also arise from the unrealistic expectations of teachers who assess performance from a cultural point of view foreign to that of the child (Harvey et al., 1966; Tolor, Scarpetti & Lane, 1967).

Social class differences in children's intellectual performance seem to appear sometime around the age of 3. (Golden et al., 1969; Jordan, 1971; Robinson & Robinson, 1971). Robinson and Robinson identified the development of verbal abilities between the ages of 2 and 4, and Golden et al. (1969) suggested abstract knowledge along with verbal interaction as factors significantly differentiating social classes during the third year of life. These studies point to the possible conclusion that it may not be the child's ability to learn that is impaired but rather his ability to organize and communicate patterns of thought and behavior. Wiener, Rider and Oppel (1963) found evidence of declining IQ scores among lower SES children which seemed to indicate that something emotionally disturbing happened after the age of 3.

This can be especially true if a child sees little meaning in what he is asked to do. When low socioeconomic black children were compared with low socioeconomic white children on basic learning ability, the black children were more content merely to guess at answers. Their attitudes were thought to be a possible reason for their failure to take advantage of a training session (Guinagh, 1971).

Another difference between social classes was found in perceptual abilities. The poor performance of disadvantaged first graders when compared with children from average-income families was found to be "shocking" by Gill, Herdtner and Lough (1968). They noted, however, that the disadvantaged showed comparatively greater ability on visual-motor tasks.

Radin (1967) concluded that skills and attitudes that were incompatible with middle-class values demanded intervention in early childhood so that disadvantaged children could measure up to generally acceptable academic achievement. But Rist (1970) reported that public education practices were not accomplishing this objective. Instead, a child's early performance dictated his future position in the class, thus perpetuating class barriers by a relatively immobile stratification established at the kindergarten level. Measuring learning progress in terms of imposed standards rather than the actual ability to achieve may mean an automatic disadvantage for ethnic and minority groups.

Where the immediate environment is lacking in those essentials that create an atmosphere conducive to learning, it would be desirable to correct the deficits. Where possible, learnings and skills may be transferred from a minority group culture to a dominant culture (Cole & Bruner, 1972). Culture-related forms of behavior need to be recognized and utilized in educating minority and ethnic groups (Baratz & Baratz, 1970). Baratz and Baratz suggest that research efforts should seek to discover the different rather than the pathological forms of minority group behavior. When differences are not recognized, subcultures may be pressured to conform to the dominant culture. And pressures toward conformity will leave some individuals deprived in areas of self-expression and creativity (Richmond & Norton, 1973).

All children deserve the privilege of developing and learning in an environment that promotes physical, mental and emotional health. But this need not demand a contrived learning situation. Acceptance, approval, assurance and freedom to explore an environment that presents an appropriate challenge--these appear to be the crucial characteristics of a positive atmosphere for learning. These have been found in all cultures--rich or poor, complex or primitive, educated or largely illiterate.

Summary. Early learning results from a child's response to his immediate surroundings, to the people and things that affect him. An atmosphere that conveys personal acceptance and approval by the adults interacting with the child is basic for effective learning. Disapproval, fear and uncertainty inhibit learning. Legitimate differences in ways of being and behaving become disadvantages when significant adults fail to accept a child for what he is.

Confusion in the environment also inhibits learning, whether it be excessive sensory stimulation or too many authority figures to whom a child must relate. The mechanical noise, lights, and action of a technological culture produce a bewildering turmoil that makes it difficult to formulate clear, well-defined concepts. A specific, concrete base for learning comes from the freedom to explore and discover a relatively predictable environment and to manipulate actively the materials in it. This active involvement with even relatively simple surroundings is more productive of mental development than continual sensory stimulation which reduces arousal level and produces a long-range dulling effect.

Material enrichment and equipment are less necessary than accepting and responsive people for an environment conducive to learning. The assurance of predictability in behavior expected within the context of a familiar cultural setting leaves a child free to explore, to examine and learn. In a strange, unfamiliar cultural setting, however, an environment structured for learning may be necessary as a substitute for the internal motivation that grows with acceptance and assurance.

Failure to accept and respect legitimate social and ethnic group differences, and measuring learning progress in terms of imposed standards rather than actual ability, is a major handicap for those who are unfamiliar with the dominant culture. For all social groups, the achievement of physical, mental and emotional health is the basic criterion of an optimum learning environment.

CHAPTER 5

NEUROPHYSIOLOGY: ONTOGENY OF THE BRAIN AND LEARNING

Few intellectual problems we face are as important as understanding the human brain. It is the ultimate scientific challenge confronting mankind (Eccles, 1974). Although there are many remarkable treatment forms for behavioral distortions and defects and malfunctions by the brain we still face many unknowns in our knowledge about this incredibly complex brain of ours.

As the neurosciences expand the horizon many problems are solved but many more questions press forward on this, one of the last of all intellectual frontiers. New scientific approaches and disciplines emerge to challenge these questions and the neurosciences have shown vigorous growth in the last hundred years. Despite this growth, the origin of the nervous system and each developing

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sequence is played as a dramatic mystery against only our beginning comprehension. The influences that promote the wiring and interactions of brain cells during the span of life are established beyond our direct observations. Research provides a glance or a small window to view these events. But many times the investigations must be conducted on other species than man and the results tentatively related to what we know about our own capabilities for brain performance.

Neurophysiologist Paul Yakovlev concurs with psychologist Jean Piaget in stating that "learning should not be confused with development." Development to them is a universal property to all species, whereas learning is a "species specific, yet highly individual, particular function, which is in constant change and evolution . . ." (Yakovlev, 1972).

He also agrees with other neuroscience specialists (neurophysiology, neurochemistry, neuropathology, neuropsychology, etc.) in saying that the state of the art allows only the most limited extrapolation from neurophysiological research to education and related behavior. Says Yakovlev, "In all due candor, I would caution against transposing the terms and definitions of biomorphological research into the plane of pedagogical and psychological concepts and definitions (Yakovlev, 1972).

On the other hand, there are some things we do know and can state clearly regarding the human brain--much of it taken from experimental research on humans and much from those animals which have characteristics similar to specific human structure and/or functioning.

Neurophysiologists appear reasonably certain that the human brain is not structured to mature as a single unit or organ but rather as a complex interworking of many highly sophisticated lesser elements, each separate area of functioning having its own timing and sequence of development. With this sequence progresses the overall maturation from conception throughout life. Yakovlev says that it has "an arbitrary 'beginning,' but no definable end . . . and is never complete" (Yakovlev, 1972).

Also, the functioning of the human brain progresses on a similar basis as its structure. The two are quite directly related. It would appear then that functions must develop and mature as the basic necessary structures mature.

Limitations of brain research suggest a further cautionary note: It is neither appropriate nor accurate to think of increases in brain weight, for example, as indicators of increased mental capacity. Similarly, there are other brain development sequences which to the behaviorist and the educator might appear to relate brain development and maturation directly to learning and education such as the progression of myelination, but this is inappropriate and misleading.

In spite of these restrictions and lack of knowledge, some achievements have emerged that clearly excite the imaginings of the experimentalist attempting to understand the neurophysiological bases of learning. It is the objective of this chapter to briefly recapitulate some of these research findings. The central theme in this chapter will attempt to answer these questions: How does the human brain mature in structure or neuromorphology, and in functional capabilities?

Is it possible to identify in the life of a child (a period of dramatic brain maturation) optimal time frames for academic achievements that are related to the neurophysiological substrates of development?

Gross changes in brain during maturation. At birth the average brain weight for a full-term infant is less than one pound (340 gms) or about one-quarter of the adult weight. All major brain regions such as frontal, parietal, temporal and occipital lobes that will later support sensory, motor and other complex functions are apparent but the posterior aspects (visual sensory function, visual projection area) appear more developed than the anterior ones (prefrontal areas concerned with emotional control and other cognitive functions--related to limbic lobe involved in the basic patterns of behavior). Also at birth the brain possesses virtually all of its brain cells, or neurons. With development and growth the neurons enlarge, become more expansive in their connections, and supporting elements multiply.

By six months the weight has about doubled (660 gms)in mass and the convolutions are deepening toward the mature state. The frontal lobe has enlarged somewhat from birth by this time but the major growth still appears to be taking place at the posterior or occipital brain areas. The white zone below the cortical mantle has become more distinct. At twelve months the brain weighs an average of 925 gms and shows considerable depth and enlargements of the cerebral convolutions. Hereafter the brain mass shows slower growth rate. For instance, a year later the average brain weight of a 2-year-old child weighs about 1064 gms. At this period of maturation (2 years) the brain is much firmer than preceding stages and the color of the cortical mantle is darker.

From age 2 until adolescence the growth of the brain is relatively uniform and without dramatic spurts; although girls gain slightly more brain mass than boys for the first three years of life (Aguilar & Williamson, After about 2 years of age the frontal lobe begins to accelerate in its growth and by the age of 6 this area is about equal to that of adults (Rabinowicz, 1974). The brain continues to grow in mass until the age of 25 years, but as indicated above, the maturation of the nervous system is not uniform in all brain parts throughout this growth period. For example, the brain stem is one of the first parts of the nervous system in the human embryo to begin proliferation. The cerebellum develops later.

The brain stem supports vital functions such as heart and respiration while the cerebullum, or little brain, is involved in coordinating skilled motor movements. Also, within the brain cortex there are variations of development from birth throughout the formative periods. In general, areas concerned with body sensations, vision, hearing and volitional control of motions mature early while frontal and temporal aspects involved with speech, complex recognition of sensory patterns, etc. are later to mature. Even when a child is born premature by several months, he must await an elapsed development time equal to his prematurity. Premature birth does not accelerate brain development. As there is no multiplication of neurons after birth the increasing brain is the result of progressive enlargement of existing structures and other cellular supportive elements.

Microscopic changes associated with brain development. The progressive maturation of the nervous system at the cellular level is relatively poorly understood. The process begins at about the fourth week post conception by neuroblasts located in the neural tube. By the eighth week of gestation simple somatic movements are first observed but by this time the basic organization of the reflex arc has been present for one or more weeks. In general, the intrinsic nervous elements are laid down in the embryo in a precise manner and the sequence of development follows along the pattern revealed by functional capabilities--namely, the motor or efferent system develops first followed slightly later by the sensory or afferent systems. Intrinsic connections between the frontal lobes and deeper brain structures, e.g. in the brain stem, are only beginning to emerge when the human embryo first shows reflex motions such as avoidance reactions (Humphrey, 1953). The order of development is rigorously controlled by the order and sequence of migrating and forming elements of the brain. The precise controlling mechanisms are not known. By birth, cells in the reticular formation appear reasonably mature.

In the postnatal period there is progressive elaboration of the axonic and dendritic trees of the growing neurons. The expansions of these processes are very important in establishing the neuron connections for handling electrical events in the nervous system at a later time. They have been examined in man by Purpura and Schade (1964) and in other animal species (Noback & Purpura, 1961). The results are as follows: Apical growth of the dendrite precedes basal dendritic growth. Synapses, the interface from one neuron to another, are established first on the apical dendrites (Schwartz, Pappas & Purpura, 1968), followed later in time by synapses being established on basal dendrites and the cell soma. Apparently it is important in the sequence of developing synaptic contacts between neurons that apical dendrites appear first followed later in time by the growth and elaboration of the basal dendrites. In some cell structures such as the caudate nucleus it is rare to observe synaptic contacts with neuron regions close to the cell soma even in the adult. Furthermore, neurons in deep structures of the brain mature earlier than superficial neurons of the cortex so that one can describe the maturation of the brain as it precedes up the neural axis. The dendrite pattern of the neurons begins to approach that of the adult by about 2 years of age, but the numbers and complexities of these patterns are still considerably less than in the adult.

There are only a few axons present at birth. Axons that are present course tangentially to the cortical surface. The great bridge of connecting fibers between the cerebral hemispheres in the corpus callosum are only partially developed at birth. As development continues, myelination of the axons follows the ontogenetic course of brain maturation. The greatest degree of lipid formation is in the brain stem, followed by the cerebral hemispheres with the cerebellum coming in near the last (Himwich, 1973). Prior to myelination the immature axons are ensheathed by an outer sleeve of Schwann cell that encompasses the bundle of naked axons (Peters and Muir, 1959). As the axons enlarge in diameter they conduct action potentials at higher velocities from one place to another in the nervous system. Finally the axon diameter increases beyond a critical level and myelin is formed around the individual axons with greater cellular industry. The formation of central myelin is complex, but the effect of myelination is to benefit the conduction of electrical impulses more efficiently and with greater speed and reliability. The general morphological features in the immature brain can be substantiated by concordant bioelectrical activity. In fact, most early research on the maturation of the nervous system originated in searching for ontogenesis of the electrical activity in the early brain.

Bioelectricity in the immature brain. Histological development of the brain can be closely followed by significant changes in the cortical electrical changes. In kitten brain, for example, cortical activation by peripheral nerve stimulation results in a surface-negative evoked response. (The surface of the brain is negative; deep, it is positive.) Apparently this results from synaptic activation of apical dendrites in the cortex of neurons that do not have well-formed basal dendrites (Scheibel, 1962; Purpura, Shofer & Noback, 1964). Correlative studies are necessary before more intimate understanding between maturation processes and physiological functions are available. However, in general, immature neurons, in contrast to adult cells, have lower firing frequencies (Ekholm, 1967; Hyvarinen, 1966; Skoglund, 1960), have longer-lasting hyperpolarization (inhibition) (Ekholm, 1967), are slower to conduct impulses (Skoglund, 1969), and have longer latency responses (Scherrer, 1968). All of these electrical properties have the effect of reducing the number and velocity of impulse traffic in the central nervous system.

Functional capabilities in the brain are staggered along the time maturation lines of development. For instance, Marty and Scherrer (1964) have demonstrated that the somesthetic (tactile) sensibility in the forelimb precedes the auditory system which is ahead of functional maturation for the visual system in the cat. Presumably the same phenomena is true also for man since cortical development in man essentially follows these same patterns. In other words, the anatomic state of maturation dictates the functional emergence of brain function. For instance, the long-latency for response in immature brain is largely explained by the small diameter of the nerve fiber and general absence of myelination. Other factors may also play a role in slowing the response time in the immature brain. The consequence is that the sensory message to the brain and the motor reaction over a reflex pathway will take longer to complete in a very young person than in an adult. If the cerebral cortex is involved in any part of this reaction the process will take even longer. Therefore a young person does not possess a nervous system that ensures rapid response time to many events occurring within his sensory world in comparison to the adult. As brain maturation takes place these differences become less observable. Other electrical aspects may also be important.

Cortical evoked responses in neonatal animals show pronounced fatigability (Scherrer, 1968). While the term is not very precise in identifying possible cortical mechanisms, it essentially means that there is a reduction in cortical response when afferent stimulations are often repeated over short intervals. It is known that the efficiency of energy metabolism in the neonate is smaller than in the adult (Himwich, 1962) and undoubtedly the supply of energy sets the upper limits for conducting repeated stimulations to the brain. Refractory periods, the time interval between successes in transmitting impulses in the neuron chains, is also considerably longer in the immature brain than in the adult, or essentially less ability to process neural events or input and output at higher speeds. These factors probably account for age changes in the functional capabilities and in the spontaneous electroencephalographic activity of the maturing brain. Studies relating the ontogenesis of brain bioelectrical activity are important because they provide significant correlates with brain maturation and behavioral development.

The electroencephalogram of the developing brain. There is considerable evidence that immature fibers can conduct electrical impulses before they are ensheathed by myelin. It is supposed in fact, that the added nervous system processing capabilities acquired through acquisitions of various motor and sensory skills constitute no small demand for myelination to take place. As the progress of maturation marches on with proliferation of neuron processes and synaptic interconnections there are increasing complexities added to the cerebral functions. And with this maturation there is the emergence and differentiation of the electroencephalogram (EEG) that is thought to reflect the complex maturation changes that are taking place in the underlying brain tissue. Some of the earliest studies of brain development were focusedon the ontogenesis of electrical activity. One of the first EEG recordings from immature brain was made by Hans Berger (1932). Since then there has been extensive literature available directed to the understanding of the developmental EEG in childhood (Gibbs & Gibbs, 1951).

At birth the EEG consists of irregular low-voltage waves alternating with periods of isoelectricity when very little or no activity occurs. It is very difficult to observe sleep-wakefulness EEG patterns that emerge later in life that are so distinct to various conscious states (Ellingson, 1972). The problem of identifying sleep or awake in the neonate is considerably more difficult than in the adult. Spindle-burst activity that occurs just before and during slow-wave sleep does not occur until about the second month after birth. It would also seem that during this early period the altered states of consciousness are much different in comparison to those of the adult because the cycling mechanisms in the brain stem for awake and sleep are not as well developed. Rapid eye movement (REM) sleep is almost continuous and uninterrupted during the first few months after birth, even when the child is crying or engaging in other activities (Emde & Metcalf, 1970).

With each passing week during the early part of the infant's life the EEG undergoes changes. These changes are irregular and diverse in the same person as well as across individuals related by age. For example, at birth the parietal area is more active than other parts of the brain;* but by the sixth month the posterior or occipital lobe is usually more active than other brain areas (Smith, 1937).

The irregular slow wave activity in the neonatal increases in frequency until by the first year the EEG is typically 5 to 7 hertz (Hz.). At this time the EEG arousa pattern is clearly different than the asleep pattern. With each successive year the frequencies steadily increase until the fourth year when the occipital record is 7 to 8 Hz.

It is not until about the ninth year that the EEG record in the posterior brain region (occipital pole or visual cortex) is essentially like that of the adult. The trend toward higher frequencies is still progressive in the frontal aspects (concerned with emotional control and other cognitive function) and it is not until about the age of 14 that adult records are established with consistency. After 19 years most individuals have normal adult EEG activity in all cortical areas (Gibbs & Gibbs, 1951). In general, in the awake individual, the developmental EEG changes are from slower frequencies and higher voltages to faster and more complex waveform patterns. The prognostic value of the EEG in early life is of relatively limited value in identifying subtle abnormal brain development. Persisting isoelectric EEGs seen in children beyond a few weeks old indicate a very serious clinical problem and hyperactive tracings may herald major malformations of the cortex (Monod & Ducas, 1968). So-called moderately abnormal EEG in children is not reliable for diagnostic purposes since many normal children are observed with certain types of paroxysmal activity in the form of sharp waves and spikes during childhood. These intermittent electric phenomena generally tail off after the age of 14 years (Petersén, Eeg-Olofsson & Selldén, 1968). Longitudinal studies involving electrical patterns in developing children across time with increased penetration into the meaning of brain electrical activity are obviously needed. Also, the structural counterparts of the electrophysiology need to be more tightly coupled to these broadly defined neuroelectric data. Until the EEG is better defined the information from complex neuronal systems is elusive. The statistical methods involving pattern recognition have not in general been applied to analyzing or validating the developmental patterns observed in the maturing brain (Vaughan, 1974).

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*The complete significance of this is not clear, but it does show that development occurs from core of brainstem outwards.

Determinants of neural plasticity. There is widespread belief that the shaping of neural ensembles that will eventually form the organization and behavioral constructs in the adult are determined by some kind of functional pressures. Also it is believed that the formation of the neural nets supporting a behavioral task starts as a fundamental reflex and expands as the elementary response emerges and encompasses more and more complexities. In other words, simple reflexes provide the behavioral substrate for all of our activities.

On the surface this postulate seems plausible but it is too simplistic. It is true that the commitment of the neural mass in the developing nervous system is not only intrinsically determined, but it is also influenced by demands from peripheral devices which the brain cells will innervate. To isolate the genetic influences from the periphery adaptation is an incredibly complex task as far as reconstructing the interplay of these two influences. The orderliness and careful time sequencing of these proliferating events during development are fascinating and astonishing. In addition, though it will not be discussed here, there are complex biochemical influences, i.e. hormones and nerve growth factors, that are brought to bear in the developing brain (Prestige, 1970). The end product is an immense and complex brain capable of diverse actions throughout the body.

The duration of neural development is variable. And apparently the ordered time sequence from one brain system to another is only partly coupled with other systems. Thus the rate of development may be accelerated or slowed within the same species (Kollros, 1968). Often it does not proceed in a smooth fashion. Also the synchrony between the periphery and central nervous system suggests that the two developmental processes are interacting during maturation. At other times the brain development appears to be isolated from other nervous system elements. For instance, the motor system can develop in the absence of sensory input (Eccles, 1968). Consequently the motor system is capable of initiating and sustaining motor actions without sensory influences. Eventually, however, there is neuronal linkage between major brain systems via differentiation of populations of interneurons.

Once the bridge is established and maturation of the neurons is complete the brain continues progressive refinement of cerebral signals. This maturation is variously defined but is essentially associated with brain plasticity. The complex phenemona called learning is one aspect of brain plasticity. But so far only a few phenemona have emerged that shed some light on brain mechanisms involved in learning or memory storage. Most of the work gives only indirect evidences of how learning occurs.

Bennett, Rosenzweig and Diamond (1970) have shown that litter-mate rats exposed to so-called "impoverished" or "enriched environments" have significant cerebral cortical effects. The "enriched" animals have thicker cortex, increased enzyme acetylcholinesterase activity, greater number of glial elements and neuron cell somas of greater diameter in comparison to the animals reared in "impoverished conditions." (This does not necessarily indicate increases in mental capability in rats or humans.) Attempts to extrapolate these animal studies to man are not easy because of many unknown factors that might contribute to these effects. The results do point up the interesting prospect that the brain is more modifiable by environmental conditions and learning situations than previously thought. Clearly, the functional architecture of the brain must be capable of plastic and dynamic change. Otherwise how do we support memory or learning abilities?

The synapse is often thought of as one location in the nervous system where possible alterations may play a key role in neuronal plasticity. Other speculations involve changes in brain proteins or other macromolecules (Hydén, 1972). The issues are not resolved, though in the first case the problem is reduced to a statement that repeated synaptic usage strengthens or modifies synaptic connections (Eccles, 1970) whereas in the second case learning brings about chemical changes or synthesis in the neuron or glial. Support for either concept is largely derived from disuse experiments where the synaptic input is effectively reduced by dissection, lesions or chemical methods. At this time there is no compelling evidence to support the idea that only one mechanism underlies plasticity in the brain.

It is currently fashionable to view the brain as an information-processing system having a memory storage element with communications over input and output lines. Electrical events in this system are relatively short, i.e., a few milliseconds, and are responsible for managing sensory and motor actions, along with many other functions. The spike events (EEG movements or action potentials) are not durable in the same context as a learned experience. There is considerable evidence that the effects of learning can last a long time.

The efficacy of the learning process is not entirely known but there is a flowering of concepts within the last few decades. Briefly, the ideas center around an increase in the size of synaptic contacts, or an increase in sensitivity of the nerve membrane, or alterations in transmitter neurochemistry released at the junctions. These changes are thought to involve large populations of neurons and somehow retrieval of learned events must be extracted from these ensembles of many neurons (Galambos, 1967). Various factors can tone or affect learning. For example, learning is more efficient if motivations and rewards are clear and identifiable. In fact, there is doubt that learning can occur in complete absence of motivation and reward. We are doomed if our objective is to learn without reinforcement so that some reasonable sensory selection is involved in sorting out significant events by the central connections. Otherwise a phenomenon called "extinction" occurs and correct responses to unmeaningful and repetitious events become less likely. Attention and motivation are critical in the learning scheme and conceivably could facilitate or hinder learning consolidation. The point is that the details for understanding such a simple nervous system action as memory are obscure and we can only hypothesize possible neurophysiological mechanisms. Various elements in the neuron chain can distort or render our learning useless. In the context of brain maturation, there is a difficulty in separating the nature and extent of genetic control from behavioral and cultural overlays. Both of these factors can thrust effects upon the molecular level of the brain, as evidenced by the maturation pattern of developing neurons and the fact that the learning process involves some durable changes in biochemistry, electrophysiology or anatomy of the brain. Genetics may also have an influence later in childhood by switching in effects during behavioral adaptation.

Implications for psychology and education. Obviously, not all of the developing aspects of brain growth and maturation are summarized above in this chapter. With the power of the scientific enterprise only a few facts have been durable over the last 50 years. "We are at the beginning, and not near the end, of the process of understanding development. This is not the time to summarize, but a time to prospect and project into the future; and the best thing is to turn for guidance to the living object which teaches us the lessons and also teaches us the real problems to which we are to direct our questions" (Weiss, 1958). It is apparent from both educational studies on how children learn and from the maturation of the brain that improved technology may not improve or potentiate intellectual growth. First, the child must achieve maturation of the brain. This comes about through neurobiological strategies and mechanisms in brain cells during development. Based upon the neurobiological framework of brain development it would be wrong to establish some precise cut-off point that defined the brain as fit or unfit for learning. There are sensory motor percursors for symbolic intellectual activities. When language is acquired, new brain functions emerge. Verbal reasoning does not begin before that time (Escalona, 1974). There are qualitative breaks in the unfolding of intelligence and conscious experience but from our current understanding of brain development these follow the growing capacity to process simultaneously multi-sensory information. There is something very deeply neurobiological about these maturing processes (Williams, 1970).

Summary. The study of the functioning of the human brain may be the ultimate scientific challenge to man and one of the last intellectual frontiers. Seemingly insuperable obstacles remain. Many investigations, for example, are performed on animals which cannot be performed on man--wherein the functions are similar. Yet even then apparently most of the operations in the interaction of brain cells occur beyond such direct observation.

Among the questions posed here are these: How does the human brain mature in structure or neuromorphology and functional capability? Is it possible to identify in the life of a child--a period of dramatic brain maturation--optimal time frames for academic achievement that are related to the neurophysiological sequences of development?

At birth, the human brain is about one-quarter of the adult weight and possesses virtually all its cells or neurons, and all major brain areas such as frontal, parietal, temporal and occipital lobes are apparent. With time these cells grow in size and their supporting elements multiply as well as the surrounding interconnections.

By six months the brain weight has doubled, convolutions are deeper and the frontal lobe (concerned with emotional control and other cognitive functions) has enlarged more substantially. Yet the major growth appears to occur in the posterior or occipital areas (dealing with visual functions).

Hereafter the brain mass slows in growth. The growth of the brain from 2 years until adolescence becomes relatively uniform. After 2 years the frontal area grows faster and by about 6 it is similar to adult size.

The brain parts do not develop uniformly, though the mass increases until age 25 or later. Specific elapsed times must occur for each sequence of development. Even premature birth does not except this rule.

The steps in maturation at the cellular level are not clear. Basically, the intrinsic nervous elements develop in the embryo in a definite sequence following patterns revealed by functional capabilities. The efferent (motor) system develops first,followed by the afferent (sensory) systems. The exact controlling mechanisms of developmental sequence are precise but not known.

Postnatally the axon and dendrite structures of the neurons proliferate and apical (upper) growth precedes basal (lower) development. Synapses (the interface between neurons) develop also in this sequence. On the other hand, neurons in deep structures of the brain mature previous to superficial cortex neurons as maturation proceeds up the neural axis.

Generally, immature structural features can be substantiated by similar progression in bioelectrical activity. Electroencephalography (EEG) is helpful in monitoring the maturational changes in the spontaneous electrical activity of the brain. And studies relating the ontogenesis of brain bioelectrical activity are important in providing significant correlates with brain maturation and behavioral development, though they are not as useful in identifying subtle abnormal development.

Specific differences are noticeable between the varying conscious states of child and adult (developmental differences) as recorded on the EEG. EEG records approach adult levels at various ages: the 9th year for posterior brain regions, frontal aspects at about the 14th year and, for most individuals, all cortical areas by age 19. More longitudinal, developmental EEG studies are obviously needed. Structural counterparts need to be more closely examined in terms of bioelectrical activity.

At the risk of appearing simplistic, it is suggested that behavior may originate as simple reflexes providing the behavioral substrates for human activities, then expand as elementary responses emerge and encompass more and more complexities.

Different parts of the brain develop at varying rates and not necessarily in smooth fashion. It appears that they may be slowed or accelerated by any number of factors. And the brain is more modifiable by environmental conditions and learning situations than previously thought. The refinement of intrabrain signals via the neuronal linkage between major systems is associated with brain plasticity, as is the complex phenomena called learning. But yet very little light has been shed on brain mechanisms involved with learning or memory storage. It is currently fashionable to think of the brain as an input-output mechanism for information processing and memory storage. There is evidence that learning can last a long time but is susceptible to such factors as motivations and rewards. Without such reinforcement extinction can occur. With the brain maturation pattern of development there is a difficulty of separating genetic influences from cultural and environmental overlays.

Brain research is still in the pioneering stage. Many theories have come and gone concerning maturation and learning. Based upon present understanding of the neurobiological framework of maturational patterns of development, it would be inappropriate to set some precise cut-off point that defines a brain as fit or unfit for learning.

There are specific combinations of sequences in the time lines of various aspects of the brain and unfolding of intelligence, but from our current knowledge these follow the growing capacity to process simultaneously multi-sensory information.

CHAPTER 6

NEUROPSYCHOLOGICAL FACTORS IN LEARNING

Although research data is obviously limited respecting the bioelectrical and biochemical functions--or more simply, internal functions--of the human brain, there are enough human response and behavioral or external indicators to provide a substantial body of knowledge relating to human learning and behavior. Yet extreme caution must be observed in relating areas of perception, as indicated by external means, to what appears to occur inside the brain.

To fully understand the function of the nervous system requires, among other factors, a comprehensive knowledge of the specific chemistry of single neurons and the specific connections and their localization on the neurons in various functional systems.

There are gaps in the present status of knowledge for those who attempt to relate the research findings of experimental child psychology, education and clinical psychology with medical findings (Chalfant & Scheffelin, 1969). This is particularly true when one is searching for evidnece on neuropsychological readiness for school tasks.

Yakovlev (1972) cautions "against transposing the terms and definitions of biomorphological research into the plane of pedagogical and psychological concepts and definitions." Likewise, Metcalf (1974) states that "it is not 'legitimate' to make a psychological or 'educational' conclusion from the physiological data." Yakovlev, however, confirms "that structural maturation of the brain appears generally consistent with Piaget's period of concrete operations."

The close relationship of structure and function in the development of the young child's brain now appears to be widely accepted among neuropsychologists and neurophysiologists. It is the interpretation of this concept that is the principal concern of this chapter. The basic question might be posed in this way: Is there a positive or parallel relationship between the structure, maturation and development of the brain, on the one hand, and academic achievement on the other? Or does available knowledge of the maturation and development of the brain at a certain stage in the child's life suggest that it is at this stage that he is ready to perform the tasks needed for academic learning as made possible by the current development of his central nervous system? With available research, it is not safe to say so at this time.

Age related changes in brain development. Most of our knowledge of brain structure and function stems from the experimental study of animals.

Scherrer(1968) concluded that the higher centers of the young animal seem to be able to receive and treat only a relatively small amount of information per unit of time, and that the treatment of this small amount of information is processed in nerve circuits that function more slowly than those of adults.

Huttenlocher (1966) and Ellingson and Wilcott (1960) investigated the brain development of kittens, and both studies indicated that there were striking differences between the neuronal activity and auditory and visual responses of young kittens and adult animals. A number of other studies are available relating the differences between immature and adult brains.

Bennett, et al. (1964) and Rosenzweig, Bennett and Diamond (1972) endeavored to answer the question whether experience and training in rats produced any observable anatomical and chemical changes in the brain. Bennett found that increase in weight and thickness of cortical tissue and in chemical activity of the brain were directly related to the amount of environmental stimulation (enriched experience) given to the rats. Rosenzweig and colleagues obtained similar results, but cautioned that it was difficult to extrapolate from an experiment with rats under one set of conditions to the behavior of rats under another set of conditions. And it was "much riskier to extrapolate from a rat to a mouse to a monkey to a human."

The fundamental processes of lower animals never present the same complexity of systems to be found in the higher animals (Skoglund, 1969). Brain changes similar to those in the rats of Bennett and Rosenzweig have been found in several species of rodents, and this appears to have given rise to the assumption that similar results may occur in carnivores and primates, including man. Ellingson and Wilcott (1960) believe that one of their laboratory investigations has shown that the occipital evoked responses to light flashes tend to display characteristics and developmental changes in the human input similar to the responses of very young lower mammals. Further research is necessary to test the validity of such conclusions (Rosenzweig, Bennett & Diamond, 1972).

Studies of human development by Robinson and Tizard (1966) and Tanner (1961) indicate that the brain of a full-term newborn human infant is 25% of the weight of the adult brain, compared with a proportion of 5% for other organs. Only eyes are nearer in size to adult value. By 6 months the brain weight has increased to 50% of adult weight, by 1 year to 60%; 5 years, 90%; 10 years, 95%. The weight of the brain at birth is relatively constant, in spite of much variation in the body weight of infants. Unfortunately this increase cannot be safely related to educational implications. As noted in the previous chapter, brain weight has not been shown to be significant among factors regarding mental capabilities.

The neurons are all present by 7 1/2 months after conception, and the subsequent growth of the brain is mostly due to deposition of myelin and to a vast elaboration of dendrite processes, along with a considerable increase in vascular tissue. Myelination continues at least through adolescence, and Yakovlev (1972) believes that this development may continue well beyond the ages of 30 or 40. But we do not yet have clear evidence that myelination is a significant factor in learning.

Other factors are more clear, however. Robinson and Tizard (1966) and also Tanner (1961) suggest that during the first two years after birth the appearance of function is closely related to maturational structure. Motor development is in advance of sensory development, but by 2 years of age the primary sensory area has caught up with the motor area. Sensory development continues, however, for a number of years. The nerve fibers coming from the thalamus to the cortex are not yet complete at 7 years of age (Yakovlev & Lecours, 1967). The reticular formation, an important arousing system, is not fully developed until the 10th year or later, and the great cerebral commissures are not complete until after the age of 7. In other words, there may be inadequacies at 7 years of age. But we don't know for sure what these are or what they represent. The developmental process continues throughout life.

As development proceeds, there are progressive changes in the rhythm of brain waves (Nelson, 1964). In newborn infants the cortical rhythm is poorly developed. As the brain develops, random low frequency (delta and theta) waves appear, but gradually the basic rhythm becomes more regular. By 6 years of age the pattern is made up principally of theta waves. By the age of 10, alpha waves, characteristic of the normal adult brain, tend to predominate.

In adolescence some slow wave activity is not uncommon and may be incorrectly interpreted if adult standards are used. The electroencephalogram (EEG) of infants and children is more difficult to interpret than the EEG of adults because of the presence of slow rhythms in some normal children. Such slow waves have also been found to be characteristic of senile or "childish" adults, but in normal adults the higher frequency waves (alpha, beta and gamma) are present in the waking state (Nelson, 1964).

Metcalf and Jordan (1972) have come to similar conclusions about the development of brain waves in children. The course of EEG development is not smooth nor clearly predictable. It changes throughout the life cycle, being rapid during the first two years and accelerating through adolescence. After adolescence the trend is toward a leveling off of development. There is increased variability in the individual after ages 3 to 4 (Metcalf & Jordan, 1972).

By age 5 the alpha rhythm predominates in the brain waves, then from 6 through ages 11 to 13 higher frequency (alpha) waves appear more and more (Tanner, 1961). Electrical activity is present early in fetal life, but the normal adult pattern of the EEG is not reached until about 13 years of age (Robinson & Tizard, 1966).

The latency of the response (or interval between stimulation and responses) of a newborn infant is remarkably long compared with that of an adult, or even an infant of 10 weeks, at which age the adult latency has almost been reached. The duration of the responses increases throughout childhood, with particularly rapid changes in the first four months. Adult values of response duration are reached at about 14 years of age (Robinson & Tizard, 1966).

Though EEG responses do show differences which occur through further development and maturation, little is known regarding their implications for educators. Any attempt to do so is likely to confuse rather than clarify the situation.

The development of laterality or the performance of cognitive tasks by a specific hemisphere of the brain, is also an age-related function. Metcalf's (1974, 1975) findings suggest that although lateral changes in the EEG are present very early in life (according to some, during infancy, which Metcalf did not confirm), lateral responses on the EEG in terms of specific cognitive activity do not stabilize until around 8 or 9 years of age. Furthermore, it appears that many aspects of the EEG do not stabilize until after 9 years of age, and even during the 9- to 14-year-age period there is much EEG instability.

The development of lateral dominance in the brain is evident in perceptual-motor functions which become more precise as age increases. The eye-hand coordination subtest of the Frostig test yielded scores suggesting that eye-hand coordination is a skill that is still developing through the teen years (Briggs & Tellegen, 1970). This challenges a frequently held belief that visual-perceptual development levels off at age 7 or earlier.

There seems to be no significant relationship between the emergence of lateral dominance and intelligence (Hillerich, 1964). Nor does the establishment of consistent right- or left-handedness have a beneficial effect on learning to read (Balow & Balow, 1964). But while lateral dominance does not seem to affect reading ability, retarded readers do have difficulty in distinguishing right from left in their own bodies and in right-left awareness (Birch & Belmont, 1965). Such difficulties are most likely a result of poor neurological development (Mariam, 1954).

Brain function and intellectual achievement. Tanner (1961) suggests that fluctuations in IQ must certainly reflect differences in rate of development of mental ability that correlate with differences in rate of development of the brain itself. Whether experience or stimulation can have an accelerating effect on the course of brain maturation, or whether the course of brain development in itself, if speeded up, can result in the easier performance of school tasks are questions that cannot be answered simply. They must be "answered in terms of the resultants of complex interactions, of experiential, developmental and maturational factors" (Metcalf, 1974).

Here again sound research provides indications of the sequences of brain development. The problem and the question are: How does this affect a child's learning potential in relationship to his age? And the answer is: We do not know; we can only speculate. The best answers to this question are probably found from research and experimentation in learning (including readiness) comparisons of age and achievement (including comparative school entrance age studies) and factors relating to vision, hearing, intersensory perception, and research in reading. These are more fully discussed in the pages following. The synergic effect resulting from this multidisciplinary approach may offer some clues to the brain's secrets respecting the relationship of its maturity to learning and behavior.

Perceptual training can help a child who is lagging developmentally to perform to his highest potential, but it seems unlikely that perceptual training actually speeds up development (Ames, 1969). General health (Shepherd, 1969), including nutrition, probably has a greater effect on neurological development and the resulting intellectual performance. Cravioto, DeLicardie and Birch (1966) have suggested that malnutrition delays neurointegrative development. A delay in mental growth interferes more with achievement in learning than the general social background of a child, according to Milgram and Ozer (no publication date) who studied the effects of neurological and environmental factors on language development with a group of Head Start children during the summer of 1965.

Visual perception. Vision is a broadbased neuropsychological process (Krippner, 1971). Even though a single, clear visual image may be received by the eye, a child still may not be able to decode printed material because of deficiencies in organization and interpretation present in the central nervous system due to lack of maturation. Though it is generally accepted that the human eye is as fully functional as the adult at birth, there appear to be many other factors affecting overall vision--from the difference in plasticity of a child's eyes to that of an adult's to and including the developmental advancement of the visual cortex and other related neurological functionings.

There is some correspondence in the development of the eye itself and that of the nervous system as a whole. During the first three years of life the eye increases in size (Robinson & Tizard, 1966), but there is no drastic change in refraction (Young, 1970). Then there is a clear visual progression from 3 to 7 1/2 years of age, with visual perception disabilities virtually disappearing after the age of 10 (Frostig, Lefever & Whittlesey, 1963). By the age of 13 or 14 the eye has reached its maximum growth (Young, 1970).

Animal studies indicate that the visual system of the brain develops later than the auditory (Ellingson & Wilcott, 1960). Work with young children seems to bear this out. The results of a study by Stevenson and Siegel (1969) suggest that children in the primary grades are more responsive to auditory materials while older children pay more attention to visual materials. At the time when most children enter school, the visual-perceptive mechanisms are still incomplete compared to the development of adult mechanisms (Dyer & Harcum, 1961).

Nearsightedness (myopia) is frequently the result of prolonged looking at near objects at an early age (Young, 1970). Young children and young monkeys are normally distant-vision creatures. In studies with monkeys, Young (1962, 1963) found that they developed myopia when they were kept in a restricted visual environment. Young et al. (1969) reported a study of Eskimo families at Barrow, Alaska, in which up to 58% of the children had myopia, whereas both grandparents and parents showed virtually no myopia. It might be concluded that the children's myopia is related to a closed-in environment characteristic in school attendance since other conditions remained virtually constant, and education in Alaska was not compulsory for the older generation. Ludlam (1975) concurs with Young's findings on early myopia and strongly suggests that reading earlier than the sixth or seventh year is often responsible.

There is also some support for the hypothesis that the anxiety level is related to the development of myopia (Streff, 1974). In a study of visual changes occurring in public school children, the incidence of myopia was reduced as changes were made in the school program. These program changes were related to developmental placement of children and tended to reduce stress as the children were developmentally ready to do the work expected. In 1970, 19% of the sixth graders in this school were myopic and in 1971, 27% were myopic. In 1974 sixth graders who had had the advantages of the program changes showed a significant decrease in myopia, with only a 4.4% incidence for those who had been in the system during their entire school years.

From these studies it is evident that myopia cannot be ascribed to heredity. It is more a matter of adjusting vision to near objects over a period of time. It can occur in later life as well as childhood, but with adults the strain is on the lens rather than the immature eyeball. A U.S. Navy study (McKay & Ryan, 1974) found that experienced submariners had more myopia than submarine school candidates or Navy divers or similar groups, and ascribed it to the fact that the submariners had to accommodate or adjust their vision longer to shorter distances than the other groups.

These recent findings support the observations that Hilgartner (1962, 1974), an opthalmologist, made from clinical data accumulated by him and his father in Texas over more than fifty years. His records show that in 1910 there were 7.7 cases of farsighted children to 1 nearsighted child. By 1935 this ratio was 1.8 farsighted children to 1 nearsighted child. But by 1962 Hilgartner reported a reversed ratio with 1 farsighted child to 5 nearsighted children!

These changes in ratio of hyperopes to myopes corresponded to the progressive lowering of school entrance-age laws in Texas since 1910. Hilgartner suggested that the accommodation or adjustment of the eyes to restricted areas in schoolwork, and more recently to television, might have been a factor in these changes. Newton (1972) supported Hilgartner's findings and noted that myopia still seems to be increasing.

Visual and visual-perceptual deficits are frequent among elementary school children. Coleman (1968) reported that half of the children in a sample from grades one through 6 had visual, visual-perceptual, or refractive errors, with 70% of these visual problems among males. Buktenica (1968) concluded that the child's development of visual skills is directly influenced by inborn tendencies, physical characteristics and environmental factors. Both environmental and developmental factors were emphasized by Frostig, Lefever and Whittlesey (1963) who pointed out a connection between disabilities in visual perception and poor classroom adjustment at lower age levels. Further study is needed to determine what relationship actually exists between developmental age, the visual demands made of children and the concomitant problems in vision.

Auditory perception. The development of hearing acuity is also a function of age, but it is evidently achieved somewhat earlier than visual maturity by most children (Marty & Scherrer, 1964; Stevenson & Siegel, 1969). While the development of visual perception proceeds through later childhood and into early adolescence, satisfactory auditory perception and discrimination of sounds is usually acquired by the eighth birthday (Wepman, 1960).

From 5 to 8 years of age Impellizzeri (1967) noted a consistent increase in auditory perceptual ability with an apparent relationship between physical maturation and success on the auditory perception test. Similarly, third graders were able to interpret and order auditory stimuli more readily than first graders (Riley, McKee & Hadley, 1964). The younger children could distinguish between amplitude or loudness and softness, but had difficulty in the discrimination of frequencies, or high and low pitch.

Riley et al. (1967) observed that first graders did not respond to frequency of sound in the same sense as they did to amplitude, nor in the same sense as did older children. All the children performed more accurately with amplitude problems than with frequency problems, but the older children were superior to the younger children. According to the developmental capacities of children, training in perceptual discrimination has also been productive. While auditory discrimination ability has been found to be very low for some deprived children, specific training along with social and verbal interaction effectively improved this ability (Strag & Richmond, 1973).

Intersensory perception and integration. Birch and Lefford (1963) studied the relationships among visual, haptic and kinesthetic sense modalities.

For geometric form recognition, they found that the ability to make various intersensory judgments are well developed by school entrance age. However, full effectiveness in using the intersensory information is not reached until later.

Wepman (1968) examined the early progress of children as they developed the capacity to utilize their maturing neurological systems, and concluded that maturation and development of the neural system is hierarchical, yet interrelated. He defined maturation as the establishment of the neural components necessary for sensory transmission and integration, and for motor transmission of signals within the nervous system. Development he defined as the functional adaptation of an established neural pathway. A time-bound progression of the neural system builds each succeeding layer upon previously developed layers, both in the sense of maturation and of development. It parallels the physiological maturation of the central nervous system insofar as can be determined. The following paragraphs summarize Wepman's findings:

Each person has a particular modality of choice in learning--auditory, tactile or visual. Thus there is a differential use of separate input pathways. For example, the audile child not only matures earlier in an auditory sense, but also develops his mature pathway with greater ease than other children. This differential modality distinction appears to be more a result of innate capacity than environmental factors. Wepman found no specific lack of stimulation in the homes or environments of children with poor auditory learning, or poor visual or tactile-kinesthetic learning. The children came from all types of homes.

Wepman further indicated that the use of a neural pathway helps it to develop so that it becomes completely functional at an earlier age than it otherwise would. Usually, the modality showing the most rapid development indicates the child's predilection. Thus some children are predominantly hearers, some seers; but the two major modalities--auditory and visual--seem to equalize in function by the age of 9. Whatever lags in development have been present seem to be overcome by that age.

Many children with learning problems have greater facility in the use of one input pathway over another. For example, the transmission of auditory signals may be good while visual or tactile signals may be poorly transmitted. To ascertain the effect of modality preference on learning, it is necessary to isolate the preferred modality (auditory or visual) and assess the level of achievement and potential for training whatever modality is delayed in its development. visual-motor and motor-kinesthetic pathways need equal attention, according to Wepman. Children slow at developing any of their perceptual skills, regardless of modality, will find it difficult to learn, since there are no other avenues open for learning.

Wepman distinguishes between two kinds of learning: the perceptual, prelinguistic, preoperational learning (sensory-motor) and the more complex conceptualizing type of learning with comprehension and intent. Learning difficulties may arise from emphasis on new learning at the conceptual level before a proper perceptual base has been established. At the beginning stages of learning attention must be given to the perceptual level in order to develop a basic structure for later learning at the conceptual level.

Problems cannot be solved without basic facts. Yet children are often expected to learn conceptually (comprehend) before they have developed the modalities of perception (auditory, visual and tactile-kinesthetic) necessary for comprehension. Maturing perceptual levels are indicated by the progressive achievement of skills such as discrimination, retention, recall of sounds and letters, sequential ordering of phonemes and graphemes, and the ability to interrelate one thing with another. Wepman concludes that this ability to form minimal contrasts continues to develop in most children through their eighth year.

Morency (1968) observed that perceptual abilities develop significantly during the first three years of schooling and progress individually along lines of modality (auditory, visual, tactile-kinesthetic) preference at differing rates in the same individual. Improvement occurs in both auditory and visual perceptual ability from the first to the third grade, and perceptual difficulties at the beginning of school may somewhat influence the level of school achievement for the next three years (Wepman, 1968, came to a similar conclusion). Morency (1968) also noted that the developmental level of the various modalities is of crucial importance for successful early learning and achievement in school. Perceptual readiness strongly influences later school achievement (Morency & Wepman, 1973). Generally, the child who enters school with inadequate perceptual development does not ever catch up in achievement even after his perceptual processing ability is fully developed, which usually occurs by the age of 9.

According to Morency (1968), most children in elementary school learn by any method that is used. But there are always a few children who may not be ready for academic learning because one or more of the perceptual pathways is not sufficiently developed and with perceptual deficits, learning is difficult. Grouping children into "hearers" and "seers" can result in more efficient teaching and less frustrated learning, since the modality that functions most adequately may be used to support cognitive learning (Morency & Wepman, 1973). A poorly developed modality may be improved through special training if its functioning is less than its developmental potential (Ames, 1969). However, by age 8 or 9, hearing (Morency, 1968; Wepman, 1968), and between ages 10 and 14 vision (Frostig, Lefever & Whittlesey, 1963), have reached their full development, and both training and learning can then proceed unimpeded by developmental deficits.

When a child has lacked opportunities to use his perceptual capacities or has become apathetic, stimulation and training can arouse his latent abilities. Rosner (1972) identified the perceptual skills needed to prepare for reading and arithmetic, and concluded that they can be taught to young children. Such training can be most rewarding for a child when he learns to use perceptual skills of which he is developmentally capable. But struggling to acquire skills beyond his developmental level can be extremely frustrating and discouraging.

Rosner suggested that for competent school performance, visual-motor skills should indicate an ability to analyze and organize visual data according to spatial attributes, to see specific visual patterns against larger and more complex patterns. Auditory-motor skills should indicate an ability to hear specific sounds and acoustical patterns extracted from the larger auditory environment. Rosner (1973) found highly significant relationships between auditory perception and primary reading achievement, and between visual perception and primary arithmetic achievement.

Other researchers have noted increased learning abilities when cross-modal communication develops (Geschwind, 1964; Beery, 1967; Rudnick, Sterritt & Flax, 1967). The ability to experience an object through seeing or feeling it precedes the ability to speak the name of the object. Then after experiencing the object through the senses and hearing the sound of the name, one can more easily decode the graphic representation of the printed word (Geschwind, 1964).

The ability to transfer information across sense modalities apparently is inadequately developed in preschool and kindergarten children. Jessen and Kaess (1973) gave 3- and 5-year-old children visual and visual-haptic experiences with various complex shapes, and then required them to identify the shapes by sight or feel. The children performed more accurately on visual tests than on haptic, but gave almost no evidence of cross-modal matching.

By the age of 6 this development of haptic-visual transfer seems to be relatively complete with regard to the identification of shape. However, the ability to interpret information about the size and orientation of figures develops more gradually (Conners, Schuette & Goldman, 1967). Eight-year-old children have achieved a highly differentiated sense of touch and are able to judge the sensory quality of a multi-dimensional object (Krantz, 1972).

Although intersensory integration is a distinct advantage in learning, it is evidently not the only or even the primary skill responsible for improved achievement with increasing age (Vande Voort, Serf & Benton, 1972). A total readiness--physical, social and mental--maximizes and strengthens learning achievement involving perceptual processes.

Implications of neuropsychological factors. The weight of evidence in the field of neuropsychology points to an optimum time for the learning of academic skills by the child. There is a period in which growth, maturation and development combine to make available to the child the abilities needed for structured learning in the school setting. And this stage is apparently not reached by the ages of 4, or 5, or even 6 years.

As has been pointed out, the brain reaches 90% of its adult weight by the age of 5 years and 95% by the age of 10 years (Robinson & Tizard, 1966). But the child's perceptual mechanisms are not the same as adults since myelination continues far beyond 10 years of age (Yakovlev, 1972), and normal adult brain wave patterns are not fully established until about 13 years of age (Tanner, 1961; Robinson & Tizard, 1966). The latency of response to stimulus does not reach adult values until about 14 years of age (Robinson & Tizard, 1966).

Fluctuations in IQ reflect differences in the rate of development of mental ability which is apparently correlated with differences in the rate of development of the brain itself (Tanner, 1961). Perceptual training does not appear to speed up development, although it may help a child who is slow in his development to perform to his highest potential (Ames, 1969).

Visual improvement shows clearly from 3 to 7 1/2 years of age and disability in visual perception usually disappears after age 10 (Frostig, Lefever & Whittlesey, 1963). Auditory perceptual ability shows a regular increase in success during the period 5 through 8 years of age (Impellizzeri, 1967). Haptic-visual transfer of information is not complete until about 8 years of age (Krantz, 1972).

Wepman (1968) delineates the relationship between physical maturation and success in tasks requiring auditory, visual and haptic perception. The nature of the maturation and development of the neural system is hierarchical yet interrelated. It is a matter of time, with the perceptual base preceding the conceptual level. Perceptual abilities continue to develop through the primary school years and determine the child's ability to learn in later years. Conceptual learning is more difficult before the requisite intersensory perceptual skills are developed at approximately 8 to 10 years of age, or even later.

Summary. In some respects the psychological implications of the development of the central nervous system (CNS) may be yet more obscure than the physiological. Greatest care must be taken in drawing psychological or educational conclusions from neurophysiological data. Yet there is sound evidence in several areas. For example, brain structure and function move along pretty much together in the maturation process. Laterality or balance of the cerebral hemispheres is not achieved for most individuals before age 8 or 9 years, and EEG-measured characteristics of the adult brain tend to predominate by age 10. Certain nerve fibers and cerebral commissures are not complete until after 7, and brain development in terms of myelination (sheathing of the axons) likely continues past age 30 and possibly into middle age.

While the implications for CNS structure and function are not clear in terms of learning and behavior, multidisciplinary research analyses in neural-related areas--vision, hearing, etc.--provide a synergic effect so that clues may be available which indepth neurophysiological research may not supply for many years. The visual and hearing mechanisms, for example, are each operationally a part of the brain. Academic requirements which levy overloads on them therefore also may stress the CNS. Also the price of such stress is evident in the measurable aspects of vision where it is found that much close work or closed-in environments often induce nearsightedness. There is apparently some relationship between visual stress and classroom adjustment and learning disability. Findings in some areas of both vision and hearing suggest age 8 or later as optimal for ease of teaching and for optimal learning at a creative level. Reading, for example, is a complex intersensory process trading with broad and deep CNS implications. Perceptual readiness based upon intersensory maturity is obviously important to ease and quality of learning. Whether or not the younger child can read or write is not the question here. Rather, should his brain be stimulated or pressured into regular academic tasks before he reaches the optimal age?

CHAPTER 7

READINESS FOR SCHOOL

The time to begin formal learning in a situation especially structured for that purpose should be a milestone in the child's intellectual and social development. But the skills and personal development necessary for a child to benefit from a school experience have not been clearly determined. A number of screening tests seek to identify those children who have acquired the ability to profit from school entrance (Ames, 1963; Ames & August, 1966; Ahr, 1967a; Kaufman & Kaufman, 1972). Still there are complex variables that confuse the issue (McCarthy, 1955; Brenner & Stott, 1973).

School entrance-age laws appear to be generally arbitrary in nature (Forgione, 1975), and there has been a wide variation in school entrance policies in the U.S. Data compiled in 1966 showed that in some states children could enter elementary school as early as age 4, or they could be exempted as late as age 9. Compulsory entrance ages ranged from 6 to 8

(Steinhilber & Sokolowski, 1966). There have been few changes in the last decade except that the Head Start and preschool movement has tended to push academic-type instruction below the first grade so that the age for beginning such structured learning has become even more obscured.

There is uncertainty as to whether a child must have developed a readiness for school before he is subjected to academic-type instruction (Brenner & Stott, 1973), or whether he must have formal school training in order to develop readiness (Rosenthal, 1969). Rosenthal's findings suggested that both of these circumstances were operating in a group of kindergarten children. In assessing their reading readiness, she found that the readiness achievement of the younger children was related to their kindergarten training. For older children, however, who had achieved readiness without kindergarten training, maturation was deemed important.

The nature of readiness. Before school readiness can be determined with any degree of success, its nature must be understood. Jensen (1969) refers to readiness as the achievement of certain subskills along with the developmental maturity to integrate these subskills into a desired skill. If the desired skills to be attained are eventual competence in reading and math, what subskills are necessary and when and how are they achieved?

McCarthy (1955) examined pre-entrance variables necessary for school success and concluded that intelligence was only one of many factors. In addition to IQ, he identified such characteristics as social maturity, emotional stability, self-reliance, and physical health. He also found a definite relationship between a secure home environment and school success. The total balance or imbalance of development must be considered in determining readiness for school (Gelles & Coulson, 1959).

The interaction of all aspects of readiness in successful school achievement was evident in a 15-year study on children's readiness for school (Brenner & Stott, 1973). In this study 69 variables were analyzed, including the age of the children at school entrance and at the time of testing. From the intercorrelations of these variables, factors were identified that influenced school readiness. Some were of a biological nature and followed a biological timetable. Others were the products of experience. But all aspects of readiness were the result, in some way, of the interaction of hereditary potential and environmental forces, a balance between maturation and environmental experiences.

Brenner and Stott concluded that the older a child is, the more he will have grown in structure and function and the more he will have accumulated in life experience and understanding of the world around him. And the greater his body of knowledge before he goes to school, the more successful the child will be at the beginning and in subsequent school years.

Kohlberg (1968) presents a similar view. His cognitive-developmental analysis defines readiness as a function of age, IQ, and the general background of experience and stimulation. He notes further that the speeding up of cognitive-structural change is extremely difficult although once a structural change has been achieved, it may form a basis for future cognitive development.

On the other hand, the learning of specific information (language, labels, etc.) is quite easily achieved but is not likely to have long-range effects on cognitive development.

Thus while specific early stimulation and training designed to speed learning may appear to have value, according to Kohlberg it does not justify teaching things earlier that will come later with less effort. For example, children can be taught with relative ease to recognize letters or the names of animals at an early age, but this does not necessarily advance cognitive development. Kohlberg's viewpoint suggests that although naming and discriminating may cause a temporary rise on an IQ test for preschool children, during grade school this type of information can be acquired with much greater ease, if it has not already been picked up, and the IQ gain disappears.

The analyses of both Brenner and Stott and of Kohlberg imply that readiness for formal school learning must include general age-linked experience and knowledge that contributes to certain cognitive-structural changes for the learning of concepts. The biological timetable of development makes ineffective the attempts to speed up this learning with specific training. But a wide range of ordinary life experiences is valuable.

The age-linked ability to interpret experience enables a child to acquire the concept of conservation, to recognize that a substance does not change simply because the shape or appearance of an object is changed (Sigel & Hooper, 1968). Kohlberg (1968) concludes that this conservation concept is the result, not of maturation only, but of interactional experience between the individual and the environment.

This acquisition of conservation, however, is not dependent upon linguistic skill, according to Kohlberg. Deaf children with no verbal skills of any kind have been able to achieve it (Furth, 1966). A lack of verbal skill apparently becomes a deterrent to learning primarily when a child is expected to use a vocabulary foreign to his particular experience (Labov, 1970). Of course, as pointed out by Kohlberg (1968), verbal skills can be developed with specific training. But if the concept of conservation is also a readiness factor, there probably is little reason to stress vocabulary learning early if it can be acquired spontaneously with age and experience.

The interactional sequence delineated by these findings is that experience, supplemented by developmental maturity, produces the cognitive ability to acquire conservation. The ability to think in conservation-type terms, plus some verbal skill in the specific language used as a learning medium, produces a readiness necessary to succeed in formal school tasks.

To support mental readiness for academic achievement there must be a corresponding readiness of the physical and motor capacities (Chissom, 1971). Simon (1959) evaluated the physical maturity of first-grade children and found on a battery of anthropometric indices that failing students tended to be less mature than successful students. Body maturity proved a very sensitive indicator of school readiness in this study.

Neurophysiological readiness, including the ability to coordinate perceptual processes, is a variable frequently overlooked in evaluating school readiness. If a child appears to have no sensory deficiencies it is assumed that he can accomplish the usual school tasks. But the findings of Morency and Wepman (1973) indicate that the child who enters school perceptually unready will have difficulty in school achievement, and is not likely to catch up even after his perceptual processing ability is fully developed.

Morency and Wepman (1973) suggested that the full development of perceptual processing ability is usually reached by the age of 9. Before that time children learn by whatever perceptual pathways are open. In studying children's learning through perceptual pathways, McGeoch and Irion (1952) observed that relatively young children learned more effectively by auditory presentation than by visual. When Budoff and Quinlan (1964) tested these findings with 7- and 8-year-old children, they found that even at this age aural learning was more rapid and efficient than learning from visual materials. This is consistent with Rosner's findings (1973) that hearing appears to be more important than vision in learning to read.

When this perceptual readiness factor is disregarded, children may be subjected to the stress of remedial programs which are totally unnecessary and perhaps confusing. Ilg and Ames (1950) said that many so-called "reading disability" cases resulted from the attempt to force unready organisms to perform beyond the level for which they were prepared. And Frostig, Lefever and Whittlesey (1963) found a relationship between visual perception and reading disabilities that completely disappeared after age 10.

From the various aspects of readiness identified by the foregoing authors, the nature of school readiness may be summarized as including

(1) a chronological age that permits the accumulation of some experience, (2) the cognitive ability necessary to attach meaning to experience, (3) a body of knowledge acquired through experience (including basic use of language), (4) physical development and anthropometric maturity, (5) perceptual discrimination, and (6) a readiness to read that arises spontaneously with the achievement of the other readiness factors.

Effect of social class on readiness. Since school readiness is partly a function of life experience, it might be assumed that children from low socioeconomic levels are lacking in necessary experience when they fail to achieve in school programs. Support for this is found in studies examining the effects of preschool experience for disadvantaged children. For example, Bottrill (1967) found no difference in the school readiness of children from different socioeconomic levels when the disadvantaged had had day-nursery experience. Bottrill's report made it clear that the preschool environment was the factor that erased the difference in school readiness that usually exists. Numerous studies show that disadvantaged children who have had preschool experience also have an increased ability to achieve in the first years of elementary school (Hodges & Spicker, 1967). Yet a closer look at other evidence indicates that disadvantaged children may not have been so lacking in experience *per se*, but only in experience with cultural variables to which formal school learning is related (Shriner & Daniloff, 1970; Beasley & Beasley, 1973).

Beasley and Beasley measured the perceptual language performance of lower SES black children and middle SES white children. The middle-class children were more ready for this task in the first grade and performed significantly better than children from the lower socioeconomic level. But by the third grade this difference in readiness was not apparent. All third graders did better than first graders, but there were no differences between social classes when the results were averaged across grade levels. This study suggests that there is greater perceptual handicap for younger children, regardless of social class.

There are apparently social class influences which determine the way a child functions as well as the way his experience-related intellectual abilities develop. Ames and August (1966) used the Lowenfeld Mosaic test, which is somewhat free of cultural influences, to compare black and white children from 5 to 10 years of age. With this instrument the responses of black children at 5 and 6 years were less mature than those of white children at the same ages. But after the age of 7 the discrepancy decreased so that the black children compared well with white children of the same socioeconomic level and favorably with other white children.

The findings of Wei, Lavatelli, and Jones (1971) tend to support the narrowing of some differences between SES groups as age increases. They found that culturally deprived children made slow progress on classification problems at the kindergarten level, although they were more successful with real objects than with abstract reasoning. But the range of difference between these children and those of middle SES became smaller at the second-grade level, narrowing with increased age.

Gross (1967) concluded from a study of middle-class Jewish children that cultural factors have a greater influence than poverty and other disadvantages on children's school readiness. The implication seems to be that the lack of readiness in children from particular SES or ethnic groups may be related to a particular way of functioning that becomes less of a handicap after the age of 7 or 8. Differences in performance between social classes may disappear by the third grade (approximately age 8) as in the Beasleys' (1973) study, or after age 7 as in the study by Ames and August (1966), and the forced elimination of differences a few years earlier may be pointless. Longitudinal research is needed to determine what real benefits, if any, accrue over time from intervention designed for early school readiness.

School entrance age. Recognizing the importance of early education and the lack of it in many homes, concerned educators have hoped that flexible school entrance policies might remedy the situation. Experiments with early admission have yielded a wide range of results. In some instances school entrance at earlier ages than usual (i.e., before age 6) has made no difference at all in achievement. Occasionally, with careful screening younger children have seemed to gain an advantage by starting their academic career early. But the evidence strongly suggests that several months to a year or more of additional age throughout elementary school leads to real benefits for children (King, 1955; Gott, 1963; Dickinson & Larson, 1963; Brown, 1973).

The conclusion of no significant difference in the achievement of children who entered school early and those who entered at regular ages was reported by Braga (1969, 1971), Spaulding and Katzenmeyer (1969), and McLeod, Markowsky and Leong (1972). There is some question, however, as to whether such reports mean that early entrants really achieved at the same academic level as their older classmates, or whether they performed equally as well in terms of expected achievement for mental age. If the latter were true early entrants would be at a disadvantage even though there were no differences in intellectual achievement measures. Although a difference in intellectual ability may not be apparent, entering school at a younger than usual age may have possible disadvantages in other aspects of life (Gaskill & Fox, 1964; Clarke & Drowatzky, 1972). Careful screening for social and physical maturity as well as intellectual ability is strongly recommended when considering such early admission (Hobson, 1948; Ahr, 1967b; Braga, 1971; Clarke & Drowatzky, 1972).

Worcester (1956) estimated that one year's acceleration of bright children would gain for our country 1,000,000 years of its best brains in a single generation. Worcester's statement would have some truth if these children were required to proceed "lock step" through the elementary school, spending a year in each grade. Such a procedure has been almost sacrosanct in American education, but it is hardly realistic in the light of children's varied abilities, experiences and rates of development.

Choppin (1969) examined data from an international study of 12 different countries, each with a distinctive educational system (Husén, 1967). On the basis of data in this report, Choppin proposed that school promotion should depend on the progress of the child and his readiness to join a new class. Schools, he suggested, should be prepared to accept new students on any Monday morning throughout the school year. And the time a child spent in any class or grade should depend on his individual needs and abilities. Thus a bright child could enter school at the regular age, or even later, and still "save" the years pointed out by Worcester.

This same idea was suggested by Klausmeier (1963). He found that both learning efficiency and motivation were likely to increase when older, bright children were permitted to accelerate their progress rather than remaining with younger, less mature children.

In the absence of this freedom for children's developmental progress through school, careful screening for an early beginning has apparently produced positive effects for some children. The results of a 10-year study in Brookline, Massachusetts, indicated that carefully selected underage children were academically superior and had fewer social and emotional maladjustments than their older classmates (Hobson, 1948).

A more recent study in Skokie, Illinois, also yielded positive results for carefully screened early school entrants. Half of these early entrants were considered superior in intellectual performance and most of the others were average or above in relation to their older peers (Ahr, 1967b). Ahr concluded, however, that the major advantage in the screening policy for early admission was that it made possible the detection of problems in those children who were not ready for school. Through referral services problems could be prevented or treated before school entrance.

There are also disadvantages in early screening programs. Mawhinney (1964) reports the discontinuance of such testing because of the disproportionate expense involved and the negative reactions of parents whose children were denied early admission. In this situation only one-fourth of the early-admits were academically superior while another fourth were below average. It was also evident that the negative effects on non-admitted children could well damage their self-image, especially when they felt that they had not met their parents' expectations and were, therefore, inadequate.

Apart from the issue of screening is that of the effect of early entrance on a child's general school progress. From Simmons' (1958) comparison of fourth graders' actual school performance and their probable performance had school entry been delayed, Green and Simmons (1962) hypothesized that delayed entrance would most likely result in greater achievement in any grade but in lower achievement at a given age. Again this would be true only if the rigid lock-step pattern of school progress were imposed. It need not occur if, as suggested by Anderson (1968), the school were designed to fit the individual child rather than trying to make the child fit the school.

Entering school early usually results in less than optimum achievement (King, 1955), while children who enter later are more likely to achieve at a higher level. Shields and Steiner (1973) found a greater variation in language skills between preschool children with a six-month difference in age than between socioeconomic levels in preschool groups. Similarly, Ilika (1969) found that 7 or 8 additional months of age at the time of entrance to the first grade enabled children generally to achieve at a faster rate.

Reading and emotional problems and some learning disabilities have also been attributed to early school entrance. Andreas (1972), who examined the records of 200 children with reference to school entrance-age range, concluded that many of these problems were either created or exacerbated by plunging children into learning tasks inappropriate for their age.

The few months' difference in age that makes the difference in learning is often determined by the time of year in which a child was born. A child who was born at the "wrong end" of the year, whose birthday comes only a very short time before he enters school, is at a disadvantage compared to those who are slightly older (Pidgeon, 1965). Unfortunately, the lower achievement of these children tends to persist over the years. Bookbinder (1967) noted increased difficulty among slightly younger children in coping with ordinary classes at the age of 9 or 10. Perhaps at this particular time, when the concept of conservation and logical thinking is becoming firmly established, those who have not yet acquired it tend to lag behind their classmates.

In any year there is probably a difference of 9 to 11 months between the youngest and oldest children in a kindergarten class or school grade. Gott (1963) tested children from the younger and older age extremes at the end of grades two through six. On Stanford Achievement tests the older groups achieved more than the younger groups in all subjects at all grade levels, except for one zero difference. This effect of entering school early goes even beyond grade six, according to Forester (1955). A study of 500 pupils whose progress was followed from kindergarten through high school revealed that children who were very bright but very young when they entered school had varying difficulties from junior high on. They were reported as being physically immature and emotionally unstable. Forester concluded that early entry could even have an adverse effect later in adult life.

The children who enter school younger are not intellectually deficient even though they achieve at lower levels and at slower rates. Using standardized tests, Shearer (1967) found that summer-born children were not at a disadvantage when age allowances were made. They were not lower in IQ, but teacher assessments of them were lower. And teachers expected them to accomplish the same as the slightly older children. This they were not ready to do.

From a stratified random sampling of fourth graders Dickinson and Larson (1963) found more high IQ's among younger children, but these younger ones were less able to achieve than older fourth graders with lower IQ's. Brown's (1973) results conveyed essentially the same message. When three groups of children (normal, bright and retarded) were matched for mental age, the older retarded children performed as well as normal children of equal mental age. The younger bright children did less well than their normal mental peers. These bright youngsters performed more like other children of their own chronological age. Brown observed that even though they were mentally advanced, they were held back by sheer lack of experience.

School entrance rationale. The age at which children are ready to begin a formal school program can evidently not be precisely fixed. There is some agreement that children who enter school later are significantly higher in achievement than those who enter early (Halliwell & Stein, 1964); nevertheless, with screening some children purportedly achieve early without trauma (Hobson, 1948; Ahr, 1967b).

Current school entrance laws and regulations seldom seem to be based on the developmental needs of children. Anderson (1968) summed up the rationale of educators for starting school at age 6. By then, educators were saying, children have acquired sufficient muscular control and language ability to begin reading. But Anderson questioned this assumption.

In reporting an Educational Testing Service study, Anderson (1968) noted that a committee of child development experts who assessed the areas of development necessary for school readiness considered sensorimotor, cognitive-intellectual and social-personal development of equal importance. Moral judgment and moral conduct were also included as readiness factors.

But only 60 percent of a national sample of 7,000 children were found to be ready for school in all or most of these respects, according to the judgment of their first-grade teachers. Anderson's conclusion suggests that it would be well to reassess school-entry ages and the purposes of early education.

Jensen (1969) noted a need for experimental programs that would actually delay formal instruction until readiness was achieved. Jensen surmised that school learning problems might thus be avoided, since forcing instruction on an unready child can result in the learning of skills with little transfer value or in the "turning off" of learning altogether.

The relationship between human development and learning and its effect on the success of formal schooling is an integral component of school readiness. There is little rationale for progressively lowering the school entrance age if later school achievement and performance in life are accepted as criteria of school success (Rohwer, 1971, 1975). From an analysis of research in this area, Rohwer questioned whether intellectual competence in early childhood, or even in elementary school, was necessary for competence in later years. He hypothesized that the longer formal instruction was delayed, up to certain limits, the higher would be the ultimate achievement. Formal schooling prior to adolescence could be radically changed with emphasis on the performance of skills rather than the retention of content. Such schooling would be expected to help children adapt to out-of-school tasks, to perform in life.

In evaluating federal programs involving compensatory education, Robinson (1973) reached a similar conclusion. Since the social environment strongly affects cognitive development, delaying academic learning until ages 10 to 14 would utilize more fully developed cognitive skills. Research is needed to determine whether such programs would successfully reduce the frustration and anxiety of so much early learning and the apathy and low academic accomplishment of later school years.

Nearly three hundred individuals who entered school from two to five years later than the customary age of 6 or 7 have reported no difficulty in completing elementary school at the usual age or even younger. It was not outstanding intelligence that enabled these people to achieve. And some could most certainly have been considered disadvantaged. The common factor in all cases was later school entrance (Moore, 1973). Moore and Moore (1972) recommend ages 8 to 10 for beginning formal school instruction.

From an extensive search of literature published to date, no clear rationale has emerged for beginning formal school instruction at any specific age. There are evidences of early schooling successes, but also evidences that greater success is achieved with less effort and anxiety a few years later. Readiness is a multi-faceted matter of individual development interacting with life experiences. Meager experience can be augmented, but cognitive development apparently cannot be forced. It will act upon experience when the biological timetable brings perceptual processes to the required degree of maturity.

To remedy a lack of achievement in the schools, concerned educators and citizens have proposed lowering school entrance ages to give children the advantage of a few extra years of education (Riles, 1972). Others have suggested revamping the curriculum to fit the laws of human development (Anderson, 1968; Rohwer, 1971). And Jensen (1969), Rohwer (1971, 1975), Moore and Moore (1972) and Robinson (1973) have examined the merits of delaying formal school instruction until the many aspects of readiness make it possible to learn with a rapidity and ease almost unknown in mass education today. Such delay would require sufficient flexibility in school entrance regulations to accommodate the readiness variables of individual children. For instance, enrichment experiences might be available for children whose environments were limited. But children with access to adequate resources could be left free to enter school at a later age with no loss in ultimate achievement or progress.

Summary. To gain the most benefit from an academic school program, a child should have already accumulated some life experience appropriate to his age. He should have acquired a basic understanding of his immediate world, and should be able to attach meaning to his experiences. Finally, well-developed perceptual abilities and physical and motor capacities are necessary for the cognitive functioning required in academic tasks.

Such readiness may be acquired at any socioeconomic level when children receive the necessary health care and attention from responsive adults. In fact, the differences between SES groups in school readiness as noted here tend to narrow as age increases. Age has proved to be a more decisive factor in school readiness than SES.

For some children who appear to be ready for school at an early age, careful screening would presumably enable them to benefit from early school entry. It is argued that society would gain from an earlier use of their academic abilities. Such children, however, may have emotional difficulties in trying to achieve what is expected of them before they are developmentally ready. Acceleration at a later age when they can better cope with the situation could give society the same benefits without handicapping the children.

Since children develop at different rates, a specific age for school readiness cannot be set. But children usually make better progress in school when formal academic instruction has been delayed until they have achieved a readiness that includes the ability to think and reason in conservation-type terms. When these children are permitted to learn without "lock-step" limitations, they progress with more than usual speed. Flexibility in school-entrance laws is very much needed so that entrance can be delayed to accomodate the total readiness of individual children.

CHAPTER 8

SEX-DIFFERENCE EFFECTS

The earliest observable differences in the behavior of boys and girls are apparently of biochemical origin (Hamburg & Lunde, 1966). Usually some form of cultural shaping is also initiated almost immediately after birth, perhaps in such a simple act as wrapping girls in pink blankets and boys in blue, thus setting the stage for gender-determined responses to the neonate. The subsequent development of sex differences, according to Hamburg and Lunde, is the result of complex interactions among genetic, hormonal and environmental factors.

It is often difficult to determine whether some sex differences are the result of biological predisposition or of psychosocial reinforcement of maleness or femaleness. Sex differences in the behavior of human newborns, [illegible]ever, are most likely of biological origin since environmental factors are [illegible]l at birth. Several examples of such early differences in behavior have been observed. For instance, Bell and Darling (1965) found that newborn males gave evidence of greater muscular strength than females in their ability to raise their heads higher. And female infants seemed to be more sensitive to skin exposure and more responsive to tactile stimulation than males (Bell & Costello, 1964; Weller & Bell, 1965). At the age of 2 or 3 months girls were still more sensitive in this respect than boys (Wolff, 1965).

These neonatal behaviors begin to interact very soon with environmental factors and exert a definite influence on the development of further sex differences. Moss (1967) found that as early as 3 weeks of age infants were shaping their own environment to some extent by the behavior they elicited from their mothers in response to crying and demands for attention. Moss reported that male babies at this early age were less easily soothed than females, and an interaction pattern was established accordingly. The common assumption that boys are more difficult to socialize than girls could very well be true because of basic differences in the biological and temperamental natures of children and adults and the resulting interaction effects.

A possible source of sex differences in neonatal behavior has been suggested by Hamburg and Lunde (1966) who concluded that there was probably some effect of androgenic hormones upon the developing central nervous system during prenatal development. Postnatally, there is not only biochemical but also neurophysiological and behavioral evidence that sex hormones, especially progesterone, enter the brain and affect its activity (Hamburg, 1966). Hamburg and Lunde (1966) have proposed that the sex differences apparent in the behavior of early infancy might ultimately affect (1) the orientation of an infant to his environment, (2) his readiness for learning experiences, and (3) his relationship with other people.

Some characteristics of gender roles. While hormonal chemistry may initially give rise to particular behaviors which generate responses appropriate to "boy" or "girl," the child's learning of a sex role and the behavior related to it is quite independent of his biochemical functioning (Money, 1961; Hampson & Hampson, 1961). The expectations associated with the male or female gender are determined by cultural and environmental conditions (D'Andrade, 1966), and are learned during the first few years of life (Hamburg & Lunde, 1966). The critical period for learning a gender role is roughly between 18 months and 3 years of age (Hampson, 1955; Money, Hampson & Hampson, 1957; Money, 1961).

A study by the Joint Commission on Mental Health of Children (1973) indicated that sex differences are in part a function of the socializing process and of the environment in which it occurs. The trends of the times, the values of various subcultures and the psychological climate of schools or other learning environments are largely responsible for the specific sex alignment of such behaviors as aggression, conformity, etc.

A cross-cultural analysis of sex differences in six cultures (Whiting & Edwards, 1973) suggested universal sex differences in the behavior of children age 3 through 11. The differences within some cultures, however, were not as great as those found between the sexes in the United States and Western Europe. In certain East African societies where boys took care of infants and assisted with domestic chores, there were fewer sex differences between the boys and girls. The boys were less egoistically dominant, less aggressive and less attention seeking than in societies where more "masculine" behavior was expected. There was evidently less pressure on these East African boys to "prove" themselves in more aggressive ways.

Whiting and Edwards also reported that in a New England community where girls had very little contact with infants and were assigned less "feminine" work, differences in the behavior of boys and girls were not as great as in other societies. The nature of the tasks assigned to children seems to be the best predictor of the gender-role behavior assumed.

Although the specific tasks assigned to the sexes may vary from culture to culture, there is a general tendency to expect males to perform those tasks demanding the most physical strength. In a study of 110 primarily nonliterate cultures, Barry, Bacon and Child (1957) found that boys were under greater pressure to achieve in 87% of the cultures and to be self-reliant in 85%. Girls, on the other hand, were expected to be more nurturant in 82% of the cultures and more trained in responsibilities in 61% of them.

Pressures on boys to achieve and to be self-reliant are by no means limited to nonliterate cultures. In the United States, Bledsoe (1967) studied fourth and sixth grade boys and girls in Georgia and found that achievement was significantly related to self-esteem for boys but not for girls. Achievement is evidently such an integral part of the male role that without it male self-esteem deteriorates (Flammer, 1971).

These pressures exist even in the early preschool years, according to Tyler, Rafferty and Tyler (1962). In their study of children in a college campus nursery school, boys were expected to be more independent than girls. The later physical developmental age of boys (Tanner, 1961), coupled with cultural sex-role pressures, suggests possible explanations for some of the vulnerability apparent in the male role in early childhood.

Boys' problems seem especially difficult in literate cultures where achievement depends largely on school-related tasks (Maccoby, 1966; Mannio, 1966). Data from 525 mental health clinics in 24 states (Rosen, Bahn, & Kramer, 1964) indicated that many more boys than girls (an estimate of more than twice as many) were brought to these clinics. The need of boys for such psychiatric help during the elementary school years reached a peak around the fourth grade.

The very real discrepancy between gender-role expectations held for boys and their ability to achieve suggests that schooling practices may be adding to their difficulties. Girls, on the other hand, are slightly ahead of boys developmentally and could achieve some things sooner. But since achievement is not crucial for girls, they have fewer school-related problems in early childhood.

Sex differences in physical maturation. In physical development sex differences are found even before birth in the rate of skeletal growth, and later differences occur in permanent dentition rate (Tanner, 1961). Tanner noted a curious lack of difference between boys and girls in primary dentition, but in skeletal age he found boys approximately four weeks behind girls at birth, and until adulthood the skeletal age of boys remained about 80% that of girls. At the average age of school entry girls were found to be approximately a year ahead of boys in skeletal maturity according to an assessment using the osseous development of the hand as an index (Flory, 1936).

From birth girls also appear to be more robust. The data indicate that fewer girls suffer brain damage at birth and girls have more resistance to disease in early childhood (Donaldson & Kohl, 1965; Dublin, 1965; Washburn, Medearis & Childs, 1965). Jersild (1968) concluded that boys, when compared with girls, have more congenital defects, are more physically and emotionally vulnerable, suffer greater damage from malnutrition and disease, and have a shorter life expectancy.

In spite of the differences in skeletal maturation, however, Garai and Scheinfeld (1968) found no significant sex differences in motor skills when boys and girls were given equal training, equipment and encouragement and provided opportunity for practice. Although motor skill differences in the sexes appeared at kindergarten age, they seemed to be more a result of cultural pressures.

An important development in physical maturation is the sudden increase of hormonal activity that occurs for both boys and girls about the same time as the maturation of perceptual processes at age 8 to 10 (Nathanson, Towne & Aub, 1941; Tanner, 1962). It is not possible to say at this point how hormonal activity relates to the expanding cognitive abilities of this age, but Brenner and Stott (1973) consider it a reliable indicator of development, including that of the brain and nervous system.

For both sexes Tanner (1962) noted negligible amounts of androgenic hormones up to age 8 or 10. Then a sharp increase occurred,with boys reaching a level of absolute values about twice that of girls. Similarly, Nathanson, Towne and Aub (1941) observed very low levels of estrogenic activity in both sexes until age 8 or 9. After that estrogenic activity increased for the girls, accelerating around age 11. These concurrent developments of increased hormonal activity and increased perceptual and cognitive abilities in later childhood present a situation that might profitably be explored.

Sex differences in affective relationships. The emotional climate of early childhood is usually related to parent-child interaction, and sex differences are highly evident. Boys seem to need maternal warmth and protectiveness during their first few years while girls indicate an earlier need for a certain amount of freedom to explore (Moss & Kagan, 1958; Bayley & Schaefer, 1964). Bayley and Schaefer suggested that girls possess a measure of genetic control in intellectual performance, but boys are more responsive to their environment and particularly to interaction with their parents. Bayley (1970) concluded that boys were more dependent than girls on the emotional climate for mental growth.

As development progresses, however, boys become more emotionally secure. Moss and Kagan (1958) found that the positive effect of maternal encouragement and concern on the intellectual development of boys diminished from age 3 to 6. And by the age of 8 to 11 boys were unaffected in their achievement by the concern of their mothers (Eklund, 1970). By then their achievement was apparently more related to the culturally assigned independence of the male role.

Sex differences in first-grade children were observed in relation to contact with parents and the desire to do well on a task (Grossman, 1969). Girls who had a close and affectionate relationship with their parents were anxious to do well, but not so for boys. Boys who had a relatively greater amount of close parent contact responded at a lower rate.

Among primary school children, relationships between their academic performance and the attitudes and behaviors of their parents have revealed further sex differences (Crandall, et al., 1964; Katkovsky, Preston & Crandall, 1964a, 1964b). The reactions of these parents to their children's achievement in grades one and three were found to be signficant, but for daughters only. As in the studies by Moss and Kagan (1958) and Eklund (1970), the academic performance of boys at this age was independent of parental behavior. There is some evidence, however, that earlier parent-child interactions influence boys' behavior in these primary school years (Bayley & Schaefer, 1964).

Boys may be more dependent in the first few years of life (Levy & Tulchin, 1925; Bayley, 1970), but by preschool age there is little difference between boys and girls on this measure (Crandall & Rabson, 1960; Tyler, Rafferty & Tyler, 1962; Kohlberg & Zigler, 1967). From school age on, however, girls appear more dependent than boys (Crandall & Rabson, 1960; Beller & Neubauer, 1963), perhaps, as suggested by Mischel (1966), because of the greater permissiveness in our culture toward female dependency.

School-age girls have also been found to be more greatly influenced than boys in acquiring moral concepts from their mothers (Edwards, 1974), and more adult conforming in moral development (Devereau, 1970). Parents do have an influence on the moral development of boys, although it seems less evident than with girls. Devereau (1970) concluded that inadequate parenting produced in boys a peer conformity with such traits as irresponsibility, childishness, anxiety and resistance to authority.

Further exploration of sex differences in parent-child interaction shows some correlation between sex of parent and the development of verbal and math abilities. But the variable of independence or self-reliance is also involved here, so sex of parent may be only an indirect influence as it catalyzes these traits in the child. Carlsmith (1964) investigated the effects of father-absence during World War II on children from intact families. Father-absence was consistently related to differences between mathematical and verbal abilities. The longer the father was absent and the younger the child during the absence, the greater the relative superiority of verbal to mathematical aptitude. This effect was greatest for children whose fathers were absent at birth or were away for longer than 30 months. There was a relative increase in mathematical ability when the father's absence was brief or occurred later in the child's life.

According to Bing (1963), the development of number ability requires independent concentration and ability to carry through a task by oneself. Early verbal ability, on the other hand, is fostered by close relationship with a demanding and somewhat intrusive mother. Perhaps Carlsmith's results are a reflection of this intrusive mother behavior which might increase in the father's absence. But whether these effects are dependent upon differences in parental expectations, the developmental maturity of boys and girls, or some other factor has not been determined.

Child-adult interactions can extend to include adults out of the home as well as parents. Even for very young children there are sex differences in response to nonfamily adults. As early as age 2, boys have appeared to be more aggressive toward adults other than parents, while girls were more compliant with adult demands and initiated more interactions with their teachers (Sigel et al., 1972).

The variables of sex are very complex, for not only does the sex of the teacher affect the child's behavior, but the sex of the child also affects teacher attitudes. Lee and Wolinsky (1973) noted differences in children's self-concept development as a possible result of the effects of male and female teachers in early school experiences. Feshbach (1969) found that student teachers tended to respond to boys and girls according to preferences they considered appropriate for each sex. And Brenner and Stott (1973) observed dynamic interaction patterns between female teachers and boys that produced lower teacher ratings for the boys. Teachers have also appeared more threatening in the preschool to boys than to girls (Formaneck & Woog, 1971). The predominance of female teachers interacting with the expected aggression of boys produces different behavior patterns for boys and girls with apparently far-reaching effects.

In early schooling the sex of a child has proved to be an important monitor of the effect the school experience will have (Beller, 1974). Mason and Prater (1966) recommended separate reading instruction for boys and girls because of the psychosocial effects of reading instruction at the kindergarten level. In this particular instance, boys' behavior was significantly changed in a negative direction by reading instruction. Boys and girls do not seem to differ significantly in nonverbal cognitive abilities (Furth, 1963; Brenner & Stott, 1973), but rather in certain skills such as verbal (Bayley, 1970; Reilly, 1971) and analytic abilities (Witkin, et al., 1954; Kagan, Moss & Sigel, 1963) which appear to be influenced, in part at least, by psychosocial factors. The sex differences found by Brenner and Stott (1973) indicated that in kindergarten and first grade the boys may be more ready for problem solving and risk taking, but girls usually achieve better where traditional learning-obeying-conforming attitudes are required.

Sex differences in school readiness. Even when boys and girls are very similar in IQ, social class, school readiness and perceptual measures, they still show a difference between the sexes in early reading achievement, with the girls giving evidence of superior average reading ability over the boys (Rosen & Ohnmacht, 1968). The girls' advantage may be due to earlier stabilization of verbal ability (Bayley, 1970; Maccoby, 1966), earlier mastery of vocabulary and reading comprehension, and earlier integration of audio and visual skills (Reilly, 1971). Boys also seem to have more difficulty with visual perception in their attempts to read (Coleman, 1968).

Carroll (1963) and Hall (1963) also observed reading problems in boys. Carroll's data suggested that this was especially true for younger children. And Hall found that boys not only achieved at a lower level than girls, but three times as many boys as girls were retained among the children who were underage at the time of entrance to first grade. It was recommended that beginning instruction in language arts and reading be postponed, especially for boys. Or, Hall concluded, if school achievement standards remained rigid, then the entrance age of boys should be delayed from six months to a year.

The same pattern appears in studies of boys and girls below elementary school age. Sex differences in school readiness resulting from kindergarten attendance were compared with the effects of a year of maturation and incidental out-of-school learning experiences for boys and girls of the same chronological age (Rubin, 1972). The effects of kindergarten attendance were negligible for the girls. Maturation and out-of-school learning had increased their readiness skills as much as kindergarten activities. The boys, however, did show some benefit from kindergarten.

Rubin concluded that the girls had already passed the stage for developing the readiness skills measured, so kindergarten had little effect on them. But the boys, who matured more slowly, were developing these skills in their kindergarten year. The boys who were exposed to kindergarten activities developed readiness skills in language, numbers, visual decoding and copying to a greater degree than boys who remained at home. Since the girls appeared to develop most of these skills prior to kindergarten attendance, a further comparison is needed to determine whether the boys would reach the same level of readiness if time were allowed for sufficient maturation and out-of-school experiences to accommodate the apparent lag in the development of boys.

Rubin's findings are supported by Coffman and Dunlap (1967) and by Marshall P. Smith (1968). These earlier studies involved prekindergarten children at an age slightly younger than Rubin's kindergarteners. At this younger age girls were better able than boys to profit from training in motor, visual and auditory-language skills (Coffman & Dunlap) and in intellectual performance (Smith). Smith supposed that these differences between boys and girls were most likely a function of greater psycho-social readiness in girls.

Generally, girls acquire language, motor and perceptual skills from several months to a year earlier than boys, and they can acquire these skills with maturation and out-of-school experience. The differences in the school readiness of boys and girls, however, involve much more than a mere differential in time for a single aspect of development (Brenner & Stott, 1973; Rubin, 1972).

Effects of learning and school success. Certain aspects of intellectual development cannot occur until the relevant physical structures are complete (Maccoby, 1966). Since girls mature physically earlier than boys (Tanner, 1961) and stabilize their verbal skills sooner (Bayley, 1970), they seem to possess an advantage in learning. Girls also acquire an IQ similar to that of their natural parents earlier than do boys (Honzik, 1957; Moss & Kagan, 1958; Bayley & Schaefer, 1964). But by the age of 6 the correlations between parent and child IQ are similar for both boys and girls (Moss & Kagan, 1958), and there are almost no sex differences in IQ during the school years (Gardner & Moriarty, 1968).

It may be for reasons inherent in physical differences and developmental rates of the sexes that school entry-age studies have so often found boys more affected than girls by early entry (King, 1955; Carter, 1956; DeWitt, 1961), or have found boys more likely to repeat a grade, especially in primary school (King, 1955; Hall, 1963; Mannio, 1966). It may be these sex differences in development, plus premature expectations of performance for boys (Bentzen, 1963), that account for the facts that 70% of all children in special education are boys (Mumpower, 1970), and boys are involved in a greater number of behavior problems (Cutts & Moseley, 1957).

Maturational factors appear to have strong influences on learning and school success, and the sexes usually do equally well when maturation has had opportunity to occur. By the age of 6, sex differences in vocabulary have largely disappeared, and by age 10 boys have caught up with girls in reading skills (Maccoby, 1966). Sometimes boys have even forged ahead of girls at the 8- to 10-year maturation period in tests of analytic ability. Witkin et al. (1954) found school-age boys higher than girls in this ability, while Kagan, Moss and Sigel (1963) found clear sex differences with boys more than girls using analytic groupings of objects in the second to fourth grades. At the earlier ages of 4 and 5, boys and girls had equal analytic abilities (Sigel, Jarman & Hanesian, 1963; Maccoby, Dowley & Degerman, 1965).

The aggression accepted as an integral component of male behavior in many cultures (Whiting & Whiting, 1962) adds to the complexity of boys' learning problems, since aggression appears to have a negative effect on intellectual performance for boys (Beller, 1962; Kagan & Moss, 1962). For girls, however, some aggression has been found to be conducive to learning and school success (Kagan & Moss, 1962).

Summary. Sex differences in gender roles and behavior are largely cultural in origin. Nevertheless, complex interactions among genetic, hormonal and environmental factors (including psychosocial effects) within the first few days and weeks of life set the stage for the development of gender-related behavior patterns.

By the age 3, children are quite aware of the expectations associated with their sex in their culture. The existence of sex differences in the expected child behavior of boys and girls seems to be universal, although the expectations are not the same in all cultures. Generally, however, males are expected to perform tasks demanding physical strength while females are expected to show a nurturant concern for the well-being of others.

At birth boys are physically about four weeks behind girls in skeletal maturity, and by school age they are nearly a year behind girls. Boys are more physically and emotionally vulnerable to environmental hazards. But intellectually there are no differences in the inherent abilities of the sexes, although psychosocial interactions that are different for boys and girls can foster or inhibit mental growth. Boys are also somewhat slower than girls in acquiring verbal skills and in motor and perceptual development.

Since relevant physical structures are necessary to support intellectual activities, findings that report boys more affected than girls by early school entry are not surprising. When maturation has had opportunity to occur, however, boys do as well as girls.

Evidence related to the effects of sex differences on learning indicates that boys are more likely than girls to have learning and behavior problems because of slower physical maturation rates, less realistic cultural expectations and psychosocial interactions in the early school years (Joint Commission on Mental Health of Children, 1973). Allowances are seldom made for the limitations of boys in early learning situations, so their abilities are frequently masked by agressive behavior (Tuddenham, 1952), negativism (Forbes & Dykstra, 1971) and low teacher ratings (Brenner & Stott, 1973).

CHAPTER 9

AGE AND ACHIEVEMENT

The conclusion that achievement increases with age has been a common generalization in much of the research concerned with children's abilities at various ages (Bayley, 1956, 1970; Fowler, 1962). A look at the composite research picture reveals variable rates in cognitive growth with continuous changes in the nature and organization of mental abilities (Bayley, 1970).

There is apparently rapid acceleration in the development of intelligence in the early years (Bayley, 1956) with some stabilization of mental factors after ages 3 or 4(Osborne & Lindsey, 1965; Bayley, 1970). Yet changes in cognitive structure and function continue to occur. Bayley (1956) found evidence that intelligence is still increasing at age 25. Bayley (1970) also observed that Bloom's (1964) definition of intelligence as a unitary mental property was inadequate because of its oversight of these continuous cognitive changes.

Bloom's conclusion that half the variance in adult intelligence can be accounted for by the age of 4 has led to much confusion in early childhood education. Unfortunately, it has often been interpreted to mean that 50% of a person's actual mature intelligence is developed by age 4, a conclusion which Jensen (1969) termed "unwarranted and fallacious." Whatever the controversy over some of Jensen's assertions, his observation that compensatory early education does not produce lasting effects on children's IQ and achievement has strong support in research. Piaget's conception of intelligence for the preschool years, for example, agrees with Jensen's evaluation in this respect. According to Elkind (1969), Piaget's findings provide no support for formal preschool instruction nor for contrived stimulation of intrinsic motivation.

Elkind (1970) further notes that, according to Bloom's analysis, 80% of total growth in mental ability takes place by the age of 8, and as formal schooling progresses the rate of mental growth declines. The years before school are very important because mental growth is cumulative and depends on what has gone before. But only the potential to learn is being acquired during these years, not the learning itself, and the need for academic instruction at this age is questioned since there is as yet no evidence for the lasting effects of preschool instruction. Elkind (1969) suggests that a delay of three or four years in formal schooling would enable a child to profit more from instruction because of more fully developed mental abilities.

Palmer's (1966a) review agrees with Elkind (1970) that the years between 4 and 6 are important for learning. But Bayley (1956) identifies yet another period of rapid intellectual development--ages 9 to 11. This later childhood spurt in mental growth has also been recognized in Piaget's theory of cognitive growth (Piaget, 1952) and in studies of perceptual and conceptual development (Elkind, 1961a, b, c; Milgram & Furth, 1967; Whiteman, 1967; Bigelow, 1971). If plasticity of intelligence is associated with a spurt in mental growth, then there are at least two periods when learning proceeds rapidly--the preschool ages of 3 and 4 and the later childhood years of 7 to 11. There are maturational differences, however, that determine what can be learned easily and well at these two stages (Piaget, 1952; Elkind, 1961a, b, c).

The tempo of cognitive growth. Achievement is a combination of effort and ability. The quality of effort may be modified by interest or relevance, and the quality of ability by experience and practice. Experience can also generate interest, which gives it a role of double importance in progress toward achievement. Harlen (1968) reviewed research spanning 40 years of investigation of the development of scientific concepts in young children and concluded that the impact of experience can profoundly affect the development of thought processes, but it does not radically change the rate or order of their appearance.

Time, in relation to cognitive growth, provides an opportunity for the maturation of physical and mental abilities, but it also permits the accumulation of life experiences. Piaget (1964), whose theory of learning stages is closely linked to time spans, makes it clear that maturation alone is not sufficient if the full potential of a stage is to be realized. But growth does play a vital part in the achievement of cognitive abilities. According to Piaget (1961), every new problem or experience provokes a disequilibrium which requires a new synthesis of previous knowledge and abilities. In the regaining of equilibrium, experience can add to both knowledge and ability but only to the extent that maturation permits assimilationof the experience.

Children in the preschool years tend to perceive things globally rather than analytically (Elkind, 1961a; L'Abate, 1962). There is a general inability to decenter, to comprehend the motives and feelings of others (Feigenbaum, Geiger & Crevoshay, 1970), and there is confusion in sorting out reality and fantasy (Taylor & Howell, 1973). While such findings are relatively common in child development research, these studies are reported because they each found a definite, age-related progression of conceptual development toward a higher level as children moved out of the preschool years.

As suggested by Bayley (1956), between the ages of 5 and 7 there is a time of relatively stable and quiet mental activity. Then somewhere around the 7th birthday a dramatic acceleration of cognitive growth begins (Miller, 1968). This seems to continue for several years. Bigelow (1971) found that children's perceptions proceed from global to less global (or more analytical) styles between the ages of 5 and 10. In perceiving figures independent of their field or background, elementary school children achieved a small average increase in perceptual performance from ages 5 to 7, but they showed a highly significant spurt ahead from ages 7 to 9 with the sharpest increase at age 8.

L'Abate (1962) tested Piaget's prediction of a relatively abrupt change from a global to an analytical approach to reality at age 7. Using a multiple-choice picture story to determine perceptual style, L'Abate tested children from kindergarten to grade 5. The results were interpreted as supporting Piaget's view of cognitive change at age 7. At that age the subjects began showing evidence of a quality of thinking or consistency of reasoning that was not apparent in younger subjects.

Whiteman (1967) also reported finding a cognitive change at approximately this same age. Children from two age levels, 5 to 6 years of age and 8 to 9 years of age, were interviewed to determine their conceptions of psychological causality in story situations. There was a highly significant difference between the older and the younger children in their comprehension of underlying motivation. The younger children relied on the overt feelings expressed in the stories while older children could perceive relationships and causes for behavior that were less obvious. The 5- and 6-year-olds were typically "intuitive" and the 8- and 9-year-olds were "concrete-operational" according to Piaget's definitions.

Consistent with these cognitive changes is Kendler's (1972) evidence that the ability to control behavior related to learning undergoes a change between the second and fourth grades. Kendler studied pupils at four developmental levels (kindergarten, second grade, fourth grade and college) to determine their ability to control learning behavior and to produce symbolic responses to environmental events. The kindergarten and second grade groups showed a rapidly rising ability to control behavior but relatively little, if any, change in symbolic response production. After the fourth grade, when the pupils had achieved almost complete control of their own learning behavior, there was considerable increase in the efficiency of production.

A change in the correlation between achievement and motor abilities has also been noticed at this particular stage of development. Chissom (1971) found that motor skills and coordination were significantly related to academic aptitude and achievement for first-grade boys but not for third-grade boys. This suggests that motor ability is more indicative of general maturation for younger children. Later, when motor development is less dominant and cognitive growth is in the ascendancy, motor skills became less of a criterion of developmental level.

While children are capable of mental tasks before the "dramatic acceleration of cognitive growth," noted by Miller (1968) around age 7, until this transformation in cognitive functioning occurs they appear to learn with much more difficulty and at a slower rate. Milgram and Furth (1967) compared 6-year-olds and 9-year-olds who were expected to work with concepts in the presence of competing or distracting cues. Reciting formulas for their work as they proceeded helped somewhat, although the 6-year-olds did not profit as much from this as was expected. Nor were explanations and corrective feedback effective with 6-year-olds. Nine-year-olds, however, gave clear, consistent performances, regardless of the correction devices to which they were exposed. It had been predicted that 6-year-olds would profit more from these devices than the older children, but they could not effectively use such help no matter how much they needed it.

As already noted, the interaction of experience and maturation can modify to some extent the tempo of cognitive growth. But these modifications may merely map out different routes to the same objectives. They do not necessarily imply advantages for some and disadvantages for others. For example, in an attempt to measure intersensory communication (in this case, information perceived through seeing and manipulating objects), Conners, Schuette and Goldman (1967) compared children from low SES and upper-middle SES backgrounds at ages 5, 6, 9 and 12. At age 5 there were highly significant social class differences. The low SES children appeared definitely inferior in their perception. By the age of 6, children from both social class levels could communicate quite well a perceived shape, but not size and angle, after feeling an object which was out of sight.

In the perception of size and angle there was a gradual rise for low SES children up to the age of 9, and then a leveling off to the age of 12. There was an even more gradual rise for middle SES children up to the age of 12. At that time children from both social classes were again approximately equal in their perception, but the low SES children had achieved this ability several years sooner. The orientation of low SES children toward real, sensory perceived objects rather than abstract reasoning (Wei, Lavatelli & Jones, 1971) may have made possible their more rapid rise in intersensory communication.

Birch and Lefford (1963) found that some aspects of children's ability to make intersensory judgments were well developed by school entrance age, but full utilization was not reached until the eleventh year. They noted that at each of three age levels between 5 and 11 years girls made significantly fewer errors than boys. The extent to which such differences and modifications in the progress of cognitive growth are due to psycho-social factors has not been determined, but cognitive growth does seem eventually to override cultural factors.

Induced learning. As children's learning abilities mature, the appropriate experiences for using these abilities are not always available. Thus the learning that occurs may be only minimal or far below what might be achieved. This has been a major concern of those responsible for children's welfare. To remedy this very real handicap to learning, numerous attempts have been made to provide for children the experiences they lack.

There is evidence that training, within genetic or biological limits, can improve intellectual functioning (Bayley, 1966). But in summarizing the ultimate effects of programs designed to induce cognitive growth in early childhood, Bereiter (1967) maintains that there really is no answer to the question "How much can the intellectual development of young children be accelerated?" Bereiter says that children can be taught specific things, but this tells us precisely nothing of their potential abilities.

Certain efforts to teach specific concepts and skills to children at a younger age than they would normally be expected to achieve such abilities have at times been successful. Children are not usually expected to perform the operations required in the logical solution of complex problems until later childhood or pre-adolescence, yet Engelmann (1967) gave preschoolers specific instruction and practice in the component skills and logical steps necessary to solve a problem. Although the disadvantaged children in the group never did grasp the problem, the advantaged children seemed to learn quickly. Engelmann concluded that the ability to handle such problems was a function of training rather than development.

Similarly, with structured instruction Young (1969) was able to induce the learning of conservation concepts in 3- and 4-year-old children. Anderson (1965) also managed with bright first graders and with individual training sessions to induce rather complex problem-solving behavior. Towler (1968) gave 15-minute training sessions for conservation problems to 6- and 7-year-old children and found that they not only learned but also retained and transferred their knowledge. Brison (1966) experimented with 5- and 6-year-old kindergarteners to induce and accelerate the acquiring of the concept of conservation. With training, half of the subjects were able to understand conservation to some extent and the induced concept appeared no different from that acquired "naturally." The children, however, found it difficult to cope adequately with the demands made of them and their cognitive structures were described as being in a state of disequilibrium.

These studies indicate that children can be trained to learn some concepts at an earlier age than is usually expected. Other studies, however, raise the question of the authenticity of early training-induced learning. Even though learning does take place, it is very likely to be limited in scope (Deal, 1966; Stern, 1967), to lack permanence (Keister, 1941; Clarke, 1968; and Bryant & Trabasso, 1971), and to be of little benefit to the child in total learning achievement (Beilin & Franklin, 1962; Keislar & Stern, 1970; Nelson & Earl, 1973; Willoughby, 1973). Shapiro and O'Brien (1970) caution that the apparent early attainment of such learning abilities cannot be taken for granted, and Bereiter (1967) questions whether the time and effort required to teach them can be justified.

The lack of permanence in earlier-than-usual learning may at times be a detriment to later learning. Keister (1941) found that three groups of children who learned to read before they reached a mental age of 6 made normal progress during their first year. But their reading skill tended to disappear during the summer months between grades one and two. This loss was not made up in succeeding years. The children were permanently retarded in reading after the beginning of the second grade.

Clarke (1968) attributes a lack of permanence in early learning to a lack of continuous reinforcement or enduring experience. He suggests that it is not so much age or the intensity of training as it is the subsequent, consistent and persistent exposure to reinforcing experiences that gives any permanence to early learning. At later ages learning seems to be retained without this constant repetition.

With situations structured to produce specific learnings, even though limited, and the reinforcement necessary to maintain learning, educators have hoped it would be possible to increase children's learning achievements. But children have often been unable to use the information they have been trained to produce.

Willoughby (1973) found that special training for two different methods of solving problems involving choices was not really effective until the fourth grade. Kindergartners with training performed no better than a control group without training. Second graders benefited by training for one of the methods but not the other. In this study it appeared that the manner of presenting stimuli determined the level of performance, but the ability to use information gained through training was a function of increasing age.

This same functional relationship appeared in the findings of Keislar and Stern (1970). In this study mental age was a significant variable in second and third grade children's effective use of problem-solving strategies.

Children in the highest mental-age group were superior when taught a complex strategy. But those with a lower mental age performed better when taught a simple strategy. They lacked the ability to use the more complex strategy effectively, even when carefully taught to do so.

Nelson and Earl (1973) likewise found that preschool children could be induced to acquire abilities, but they lacked the skill to relate these abilities spontaneously to routine learning tasks. In training trials for using category questions to get information the children seemed to accomplish a task with greater speed, but later testing showed they were no more efficient than children in a control group with no training. The skills which a child learns must be matched to his available conceptual abilities if there is to be a substantial developmental change in cognitive performance, according to Nelson and Earl.

Regardless of training or experience, Beilin and Franklin (1962) observed that a child's developmental level places a limit on what he really learns, whether or not he receives instruction and training. They found that in the achievement of the ability to measure area and length third graders received greater benefit from instruction than first graders. With third graders the influence of instruction was minimal only in areas where few gains were possible because concepts were already operational. But no first grader, even with training, achieved operational area measurement. The ability to profit from instruction in developing the concept of measurement correlated with the developmental level of the child, and supported the proposal of Piaget, Inhelder and Szeminska (1960) that development limits what may be acquired by virtue of experience or training.

Almy et al. (1969) made a three-year study to test the progress of early training in logical thinking, with divergent results. Systematic instruction in the basic concepts of math and science were begun in kindergarten for one group of children, in first grade for another group, and in second grade for a third group. The paradoxical results suggested that the groups may not have been comparable in all respects since children whose prescribed lessons began in the second grade performed about as well as those who had been having lessons since kindergarten, and those whose lessons began in the first grade gave the poorest performance.

There may have been problems of comparability in this study. On the other hand, the second graders who were being instructed in these concepts for the first time may have been approaching an age when they could receive greater benefit from instruction, and thus learned the concepts more rapidly. Those whose instruction began in kindergarten might have done equally well because of reinforcement over a three-year period.

This difficulty that children have in using what they learn in the preschool and early elementary school years is indicative of their mode of thinking. According to Ausubel (1962) elementary school children think intuitively about abstract ideas. This is characteristic of them until early adolescence. Ausubel further asserts that the argument that younger learners achieve intellectual skills more easily than older ones has not been validated. Program structure and continuity, and diligent effort can induce early learning skills. These skills, however, are generally not used productively until several years later.

Expanding cognitive abilities. As the tempo of cognitive growth moves into the 7- to 11-year-old period described by Piaget (1952) as concrete-operational, the child finds himself able (and eager, if he has not been discouraged) to perform new mental operations with the concepts and symbols which he has been accumulating during the early childhood years. While specific training or instruction may have induced some intellectual skills relatively early, the ability to reason or think consistently, to perceive relationships and to make logical choices appears to be a function of this later development (Phillips, 1969).

Even verbal ability in a native language, which arises spontaneously in normal child-adult communication and may be induced in a structured environment, cannot be forced beyond certain cognitive limits of comprehension. Basic language structures are by no means mastered by the age of 5 or 6 as has been commonly supposed (Chomsky, 1972; Palermo & Molfese, 1972). Chomsky (1972) found a surprisingly late acquisition of understanding of sentence structures. The active mastery of common structures was taking place up to the age of 9, and perhaps even beyond.

Overall cognitive development is interrelated with the ability to recognize and organize the components of language (sounds, word meanings, etc.) for communication and there is a gradual consolidation of language structures from kindergarten up to the seventh grade. Abrupt shifts in verbal performance have been noted between kindergarten and first grade and again between grades 5 and 7 (Palermo & Molfese, 1972), but the phonological system has apparently not been completely mastered until this later stage.

These findings tend to concur with Hall (1969) who found that children's ability to recognize and discriminate between word meanings increases with age with a near-perfect performance in the fourth grade. And Brook (1970) found that children's ability to recognize the origins and arbitrary value of names continues to increase as late as age 10.

In comparing the difference between relatively "primitive" serial or rote learning and paired associate learning, Jensen and Rohwer (1965) observed a very steep gradient for paired associate learning between the ages of 7 and 13. With kindergartners there was very little effective learning by association, but as verbal experience enriched the associative network and more verbal mediators became available, such learning increased rapidly. Jensen and Rohwer also noted a correlation between paired associate learning and mental age. The rise in serial learning, on the other hand, was gradual with younger children and almost nonexistent after the fourth grade (age 9). Serial learning was correlated with IQ, but did not require the cognitive development necessary for learning by association.

A similar sequence in learning was found by Williams (1971) in testing children's attainment of the concept of number. In kindergarten children could recognize symbols for a number, but number operations such as addition and subtraction were evidently beyond their ability. The recognition of words and numbers is a common preschool accomplishment, but the ability to use these symbols in relation to each other depends on cognitive structures that continue to develop throughout the childhood years.

O'Brien and Shapiro (1968) noted the expansion of cognitive abilities when they tested the development of logical thinking and concluded that hypothetical-deductive thinking cannot be assumed until after age 8. Between the ages of 6 and 8 children were quite successful in recognizing logical conclusions. They could identify such conclusions but apparently could not understand why they were necessary. The difficulty with abstract thinking prior to this age is also seen in relation to causality (King, 1971), the concept of time (McAulay, 1961), the use of problem-solving strategies (Odom, 1967) and the making of choices or decisions (Birch & Bortner, 1966; Lewis, 1966).

Such a common achievement as differentiating right and left affects the formation of abstract relational concepts, according to Elkind (1961d) who tested children aged 5 to 11 for right-left discrimination. In Elkind's study children made no distinction in their conception of right and left before age 7 or 8, and full differentiation was not reached until age 10 or 11. Elkind concluded that the attainment of this abstract concept of discrimination was a developmental measure of cognitive ability. Furth's (1963) analysis of data from a nonverbal, part-whole discrimination task shows a similar increase in ability to discriminate with a marked decrease in errors at age 10.

It is the acquisition of abstract thinking ability, of course, that enables a child to recognize and use conservation concepts. In most cultures, for the schooled as well as the unschooled, this begins to occur consistently at about age 7 (Goodnow, 1968). There is, however, some evidence that it appears later in cultures where explicit definitions for everyday occurrences are lacking, as with the Wolof bush people's tendency to explain changes by "action-magic" (Greenfield, 1966). In this African culture school children were 11 or 12 years old before they acquired conservation, and only about half of the unschooled could grasp the concept. The ability to make appropriate explanations contributes to the development of this concept (Peisach & Wein, 1970), and the Wolof's magic-orientation placed limitations upon them.

Such delayed acquisition of conservation emphasizes the impact of experience on conservation-type reasoning, but Keasey and Charles (1967) make it clear that experience is not a sufficient factor. A certain level of mental functioning must also be reached before a child can perform these logical operations. For both normal and retarded children, Keasey and Charles found that experience was no advantage without a requisite mental age.

Strauss and Langer (1970) sought to induce operational thought and assessed the conservation concepts of 5- and 6-year-old children both with and without training. They found a greater trend toward conservation among the older children whether or not they received the training. Whether experience has been acquired in routine activities or in special training, the level of mental development at the time of the experience determines the ease with which conservation can be acquired.

Achieving success in school. Success in school is commonly associated with the ability to assimilate and use an organized body of knowledge, much of it abstract or academic in nature. Miller (1970) identified eight factors in primary school children that were correlated with school success. Six contributed to achievement and two detracted from it. All factors were related in some way to the child's adjustment in family interaction. Children who achieved most successfully tended to like school, had a desire for an education, and sensed a use for school learning in the demands of some future job. They also had acquired confidence in themselves, felt free to think and to act, and perceived their parents as supportive but nonindulgent. Feelings of parental dominance or of deprivation led to a lack of achievement.

While many attitudes toward school undoubtedly originate within the family, an international study of mathematics achievement (Husén, 1967) suggests that these attitudes are also related to the age at which a child enters school. For children from 12 nations (Finland, Germany, Japan, Sweden, Belgium, France, Israel, Netherlands, Australia, England, Scotland

and the United States) information was obtained regarding performance in mathematics at age 13, attitude toward school, and age of school entry.

Austin (1972) commented on the implications of this study and noted that school experience at age 5 had little effect on later mathematical ability but might be somewhat beneficial. School experience at age 6 was thought to be rather important and the lack of it at age 7 was termed detrimental. Rohwer's (1971) ranking of the correlations in this study, however, showed that these effects noted by Austin were not statistically significant. What was significant was a strong negative correlation between school entry age and attitude toward school. Additional years in school did not contribute significantly to average performance in mathematics; but the earlier children had started to school, the more negative were their attitudes toward school.

Huberty and Swan (1974) found that predictors of successful achievement in the first grade were different for children who had had three years of preschool experience and for those who had had no preschool. Without the early education experience, first grade success depended on general readiness factors (physical and social maturity, age-related experience, etc.). Several years of preschool experience affected behavior variables so that such things as aggressiveness, cooperation, attentiveness and communication became predictive of success in most verbal areas. Readiness, however, was still the most important factor for success in arithmetic and in understanding paragraph meaning.

Positive effects of preschool and kindergarten experience have been noted in helping children to overcome weaknesses in specific skills (motor, visual, auditory-language). According to Coffman and Dunlap (1967), children who attended nursery school or prekindergarten made greater gains in these skills than those who were not in school, even when programs were not specifically structured for skill development. No follow-up evidence was provided, however, for the children in their school years.

A number of studies (King, 1955; Baer, 1958; Gott, 1963; Halliwell & Stein, 1964; DeWitt, 1961; Feyberg, 1966; Arena, 1970) indicate that age, both chronological and mental, has a close relationship to success in school. Mental age is the greater influence on achievement (Feyberg, 1966), but the younger a child is when he starts to school, the more chronological age appears to affect his progress throughout his school life (Forester, 1955). King (1955) reports that children who entered the first grade before they were six years old failed to realize their optimum academic achievement. Cumulative records over a period of six years revealed a continued disadvantage for them, even though as a group they had a slightly higher IQ than those who entered school from six to nine months later. Children in this younger group were also more likely to repeat a grade.

Conclusions similar to King's were reached by Halliwell and Stein (1964) when they calculated the mean IQ and achievement scores in relation to chronological age for fourth graders. From their results they hypothesized that the age-effect on achievement would approach zero as tests became less reading oriented, and this was partially supported.

Arena (1970) found that mental maturity was not only associated with academic achievement, but it accounted for 55% of the total variance in achievement. And Feyberg's (1966) results showed that successful school achievement in areas requiring the use of concepts, such as numbers, classes, and spatial and causal relationships, were highly correlated with mental age. The development of these concepts was especially associated with success in arithmetic, problem-solving and spelling.

As a society we attach great value to academic behavior. Parents rate themselves as parents by the school achievement of their children. And children strive to achieve, not for the sake of learning but for the approval and recognition of parents and teachers. Strom (1965) observed that the excessive value attached to academic achievement and the pressures to grow up and achieve earlier could be damaging to personal development. Strom suggests that families who want the very best for their children are often unaware of the frustration of early education--the challenges that are too great, too physically taxing,and the personal relationships based on adult approval rather than on firmly established emotional bases. Strom placed in perspective the consideration of achievement in relation to age when he observed that the only path to maturity is by way of childhood; that is, the future citizen must be a boy before he is a man.

Summary. There are continuous changes in the nature and organization of mental abilities from infancy into adulthood. During the early years of life the potential to learn is acquired, but actual learning continues throughout life.

In the preschool years things are perceived globally rather than analytically with no clear distinction between the real and the imagined. Then a dramatic acceleration of cognitive development around age 7 or 8 enables children to perceive relationships and causes and to achieve a control over their own learning behavior which permits increased efficiency of cognitive production. At this age learning becomes much easier and proceeds at a faster rate.

Training, within genetic or biological limits, may induce learning at younger than usual ages, but such learning is likely to be limited in scope, to lack permanence, and to be of little benefit to the child in later learning and achievement. Although the children do learn, they have difficulty using what they have been trained to produce, and they quickly forget what they have learned unless there is continuous reinforcement. Specific training to solve problems becomes really effective only at the fourth grade level. The tedious repetition necessary to maintain learning before then tends to reduce motivation and can be a detriment to later learning.

Between the ages of 7 and 11 children are able and eager (if they have not been discouraged) to make rapid intellectual advancement. During this time almost complete mastery of common language structures occurs. The abstract thinking ability necessary for understanding conservation concepts is possible, and children can now use symbols (letters, numbers, etc.) in relation to each other.

Successful school achievement most often stems from home-related attitudes that contribute to a liking for school. A positive sense of self-worth, confidence in one's self, a sense of freedom to think and to act, and a sense of purpose in learning are significant components of these attitudes. Such attitudes are characteristic of a certain maturity which is highly correlated with chronological and mental age. And this age-related development of personal and intellectual readiness can lead to the achievement of specific skills, such as reading and logical thinking, with comparatively little effort. Successful learning can be the expected outcome of a child's expanding capabilities and personal development if he has not been discouraged by demands beyond his ability to perform.

CHAPTER 10

LEARNING TO READ

In a literate culture probably the greatest culmination of early childhood learning is achieving the ability to read. The achievement of this ability becomes a major influence on most later learning, at least as far as structured education is concerned. The ability to read is a highly complex function of the central nervous system (Ayres, 1968) requiring a degree of brain maturation that enables a child to recognize visual symbols and the sounds they represent (Crosby & Liston, 1968). The sounds, in turn, must form words representing concepts with which a child has had some experience (Quigley, 1973).

Conditioned to read. It is not the eye that reads words on the page, but the brain (Krippner, 1971)--the brain with all its stored associations and the meanings assigned to previous experiences. Children who learn to read easily and early have varied backgrounds (Durkin, 1963), but their experiences and certain characteristics in their environments seem to predispose them to an interest in reading.

Durkin found that many children who learned to read at home before going to school came from homes where education was apparently valued. Many of their parents were foreign-born, but the mothers tended to have a high level of education. The families were usually smaller than those of other children, which may have provided more opportunities for child-adult communication. The children themselves generally walked and talked earlier than usual, but were content with relatively quiet activities and had little television.

The influence of the mother on a child's motivation to read has also been reported by Hess (1969) and Hirst (1970). Hess identified maternal behavior and cultural background as key factors, and Hirst pointed out the mother's education as a very good predictor of the child's beginning reading achievement in school. In the first grade reading ability has been associated with such home-related variables as the presence of books in the home, being read to by adults, and being "taken places" (Milner, 1951).

Older siblings as well as adults may contribute to a child's interest in reading, especially if a sibling is only two or three years older and likes to play "school" (Durkin, 1961). Children learn a great deal from each other and a sibling can unconsciously teach a younger child. The child absorbs what he is capable of learning without pressure and probably with considerable delight that he is learning to do what his slightly older peer can do.

The joy of accomplishment is a tremendous factor in building a positive sense of worth. Wattenberg and Clifford (1964) found self-concept measures significantly predictive of reading progress. Achievement in non-academic areas is equally effective in enhancing the self-concept and the ability to read. Responsibilities for home duties and for self-care insofar as a child is able were found by Milner (1951) to be positive factors in learning to read.

Learning to assume responsibility gradually decreases a child's helpless dependence on adults. This may also affect reading success, since excessive dependency has been associated with low achievement in reading among third-grade children (Wells, 1970). And positive correlations with reading achievement were found for third-grade children who were able to dress independently and had regularly assigned home chores (Hoffman, 1971). Being the firstborn and having many friends also had positive effects on reading in Hoffman's study. The experiences provided by parents and later directed by teachers form the foundation on which reading achievement is built.

Factors in reading success. Children may learn to read spontaneously or with teacher assistance. Creating the conditions conducive to reading can result in spontaneous learning to read before going to school, but this will not necessarily result in problems in school reading (Durkin, 1963). Ilg and Ames (1950) noted that children may show a marked interest in letters and words at an early age, but they are not likely to push themselves beyond their ability to achieve. Sutton (1969) observed that the spontaneous reading of kindergarten children did not exceed 20 hours a year, yet resulted in continuous progress. Overanxious adults are the ones who frequently apply pressures for early reading. But pressuring children to perform at a level for which they are not prepared results in many cases of so-called "reading disability" according to Ilg and Ames (1950), and there is no advantage in the long run (Smith, 1965).

Even without a supportive environment and with poorly trained teachers, many children learn to read in spite of severe handicaps (Sheldon, 1970). And Crosby and Liston (1968) strongly suggest that an intelligent child who is neurologically, culturally and emotionally normal will discover how to read all by himself if he is sufficiently motivated and then left to his own devices.

Parents and teachers, however, who create an environment conducive to reading, and who are supportive of children's efforts without exerting undue pressure to achieve, greatly facilitate children's learning to read. Weber (1971) showed that very poor inner-city children at the third-grade level had met reading success criteria and even exceeded the national norm when certain factors were present. Factors contributing to their motivation and apparently accounting for the reading achievement of the inner-city children in Weber's study were a strong adult leadership, high expectations (which the children were developmentally ready to reach), a supportive atmosphere, an emphasis placing a high value on reading, and additional personnel for individualization of the program.

The factors identified by Weber as contributing to the school reading success of third graders were quite similar in nature to those mentioned by Milner (1951) and Durkin (1963) as positive home influences on reading. This motivation from parents and teachers who care (Sheldon, 1970; Hoffman, 1971) evidently does more for children's reading than pressure (Ilg & Ames, 1950) or special early training programs (Silberberg, Silberberg & Iversen, 1972).

Programs designed to increase children's IQ seem to have little ultimate effect on learning (Bereiter, 1967). And intelligence as measured by IQ tests is apparently less important than the social-emotional environment for learning to read (Durkin, 1962; Balow, 1963; Chansky, 1963; Rudnick, Sterritt & Flax, 1967; Hirst, 1970). Durkin (1962) found that, regardless of IQ, some children learned to read very well at home.

After the third grade, however, intelligence becomes more important (Rudnick, Sterritt & Flax, 1967), but even then the effect may be minimal. Chansky (1963) worked with children 8-14 years of age in remedial reading classes, and could find no support for the belief that a higher IQ contributed to reading progress. Rather, it was age, responsiveness to small group instruction and the history of success or failure associated with reading experiences that related most to improvement in reading.

IQ does not seem to be a differentiating factor in the first-grade reading success of boys and girls, but girls achieve significantly higher than boys (Balow, 1963). The lower reading achievement of boys in Balow's study has been attributed to a lack of psycho-social readiness rather than to maturational factors. For both boys and girls, however, "maturation sensitive" tests (i.e., tests which clearly differentiate the performance of oldest, intermediate and youngest children) have shown a significant correlation of maturation and reading achievement at the end of the second grade (deHirsch, Jansky & Langford, 1966). And even the relatively rough measure of chronological age at school entry has been positively correlated with progress in reading (Andreas, 1972).

Keister (1941) reported that normal reading progress was apparently possible for under-age children in school, but their reading skills were lost over the summer and were not made up later. Likewise, Freyman (1965) found that children with birthdays in the summer, making them a few months younger than their classmates, were frequently assigned to remedial reading groups and received more than their share of low marks. These disadvantages persisted through the primary school years. Starting to school even a few months later can result in greater reading success (Hampleman, 1959).

Perceptual abilities for reading. Although Wepman (1968) concedes that the use of a neural pathway enhances its development so that complete function occurs at an earlier age, he also points out that a lack of perceptual stimulation is not a correlate of poor perceptual learning. According to Wepman, however, maturation and development of the neural system are interrelated. Consequently, perceptual processes function more precisely as they mature. Then using these processes within the limits imposed by maturation assists their development.

Reading difficulties arising simply from pressure to use immature perceptual processes are often assumed to be disabilities (Ilg & Ames, 1950).

These maturational handicaps may decrease or disappear entirely when perceptual abilities improve, usually after the third grade (Rudnick, Sterritt & Flax, 1967; Stanners & Soto, 1967; Frostig, 1968; Morency, 1968). A recognition of the true nature of many reading problems can reduce considerably the pressures and frustrations of remedial reading efforts for youngsters who need only time and a supportive environment.

For children who have real disabilities in vision, hearing or neuropsychological functions, early detection is important so that the normal exploration of their environment will be limited as little as possible. Before they reach the age for formal reading and before they are subject to academic failure these children need help in learning to use the perceptual abilities they do have. Satz and Friel (1974) suggest that such children can be identified by an early warning system using a developmental and neuropsychological test battery at the beginning kindergarten age. An assessment of this kind, available as a routine part of children's services, might provide the necessary assistance for handicapped children without subjecting unnecessarily large numbers to remedial pressures which, according to Silberberg and Silberberg (1969), have no-long lasting effect on children's reading levels. There is a great need here for research and for the development of procedures for assessing and treating perceptual problems.

It is possible that cerebral dominance may not be stabilized until after nine years of age (Metcalf, 1974), so reading disabilities attributed to this source may become less apparent as age increases. Much research in this area is relatively new, and definite conclusions cannot yet be reached. The results of ongoing studies are expected to provide valuable knowledge for understanding the neurophysiological and neuropsychological bases of reading.

Earlier studies (Balow & Balow, 1964; Hillerich, 1964) showed no significant relationship between cerebral dominance and reading achievement. Hillerich, however, noted a decrease of 44% in uncertain eye dominance from kindergarten to grade two, which indicates some progress in neurological development. Balow and Balow tested second-grade children, and Hillerich studied children longitudinally in kindergarten and again in the second grade. The conclusions of Wepman (1968) suggest that reading at these ages is probably more perceptual than conceptual in function. Thus the effects of any dominance anomalies observed in these studies may not have been as apparent as they might have been in later conceptual tasks.

The maturation of perceptual abilities is reflected in the way children achieve reading success. Many basic reading tasks depend heavily upon auditory processes, according to Flower (1968) and Rosner (1972, 1973). But in reviewing research linking auditory skills to reading, Hammill and Larsen (1974) concluded that such skills were not usefully related to reading. The degree to which a phonics approach is emphasized may be a variable here. Nevertheless, in the primary grades most children seem to learn more rapidly through hearing than seeing (Budoff & Quinlan, 1964). They also pay more attention to auditory materials than to visual (Stevenson & Siegel, 1969).

At this same time there is a high correlation between poorly developed eye movements and problems in learning to read (Grossman & Philips, 1973). Up to age nine or later visual perception deficits are a contributing factor to reading failure (Frostig, 1968). By the end of the third grade visual discrimination of word segments is well begun and is virtually maximal by the end of the sixth grade (Stanners & Soto, 1967).

From the third to the fourth grade cross-modal perception becomes more important (Rudnick, Sterritt & Flax, 1967) and the perceptual deficiencies of poor readers are not associated primarily with any specific modality (Bryden, 1972). The ability to read easily requires an efficient communication between the visual, auditory and somato sensory systems (Ayres, 1968), which is evidently not achieved by most children until this cross-modal perception has been established near the end of the primary grades.

Some children undoubtedly reach mature levels of perceptual maturation earlier than others and achieve sensory integration at a younger than usual age. But for the average child there is little to be gained from special perceptual training programs. Fortenberry (1969) reported no lasting value from visual perceptual training for word recognition in the first grade. Similarly, Klesius (1971) found no special benefit for normal children from perceptual-motor development programs to improve reading readiness and achievement. Such programs probably have a potential value, however, in remedial work with learning disabled children.

When perceptual integration and maturation has been achieved, the majority of children would apparently have little difficulty with reading if conditions and motivation were conducive to the task. Until then it is probably unrealistic to expect children to read with any degree of success by adult standards except as they do so spontaneously. Children have their own way of recognizing letters and words and it is quite different from the complex strategies of adults (Williams, Blumberg & Williams, 1970). They employ the same strategies they ~~used~~ to master play activities of the sensory motor-spatial type. They look for rules and meaning to help establish a conceptual framework for written language which they have already internalized unconsciously since early childhood for verbal language (Weininger, 1975c).

Early reading comprehension and school achievement. The ability to read becomes functionally useful only when it serves to convey meaning to the reader. Unfortunately, even children who are considered superior readers and who maintain a high level of reading achievement may have learned to read words without meaning (McCracken, 1966). To some extent this can be as real a handicap as other reading problems in general academic learning. Studies identifying this problem relate it primarily to children who were taught to read early, to perform beyond their ability to comprehend (Reid, 1966; Downing, 1970; Holden & MacGinitie, 1972).

Quigley's (1973) assessment of the pre-reading vocabulary of nursery school children in England showed that most of the children were familiar with less than two-thirds of the words they would soon be expected to recognize in

1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6
MICROCOPY RESOLUTION TEST CHART

reading books. And a group of 5 -year-olds representing a cross section of socioeconomic levels had little precise notion of what reading was all about (Reid, 1966). For these children it was not clear whether one read "pictures" or "marks on paper." They were unaware that letters symbolized sounds, and the concept of word as spatially ordered letters was difficult to comprehend.

A further investigation of questions raised by Reid (Downing, 1970) obtained remarkably similar results. Not a single child's comprehension of "a word" corresponded with the adult's concept of a word. The children had only a vague understanding of abstract terms and of the purpose of written or printed language.

In the first grade, too, children have been found uncertain of the meaning of "words" and their printed representation (Holden & MacGinitie, 1972). The printing convention is difficult for children to understand because printed word units do not always coincide with their own speech patterns. For instance, "an apple" is easy for an older person to decode, but to a small child the concept represented by these two words may have always been "anapple," a single speech unit. According to Holden and MacGinitie, it is evident that printed speech segmentation is unfamiliar to most children at school-entry age, and they have difficulty comprehending such a convention even when they are taught to identify word boundaries in print.

Brekke, Williams and Harlow (1973) suggested that an understanding of the conservation of substance be taken into account as an additional measure for beginning reading instruction. Conservation is not necessarily learned in school (Vernon, 1965; Goodnow & Bethon, 1966; Mermelstein & Shulman, 1967), but a certain mental age must be attained before a child can perform adequately in tasks of this nature (Keasey & Charles, 1967).

A comprehension of both the purpose of reading and the meaning of the information gleaned from the words read is necessary to achieve full reading success. In the fifth grade reading comprehension has been found associated with the interest level of the reading material, especially for boys (Asher & Markell, 1973). Reading skill develops rapidly when a child acquires an interest first and then discovers that reading can extend his knowledge of that interest. This is quite different from the purely mechanical decoding which accompanies a lack of interest in reading.

Heffernan (1968) suggested that experiences that extend and deepen an understanding of the natural and social world, that leave room for creativity, exploration and expression are very necessary for successful reading. For most 5-year-olds reading is an adult and cultural demand rather than a personally perceived need, and the unready child will feel inadequate, frustrated and defeated. Heffernan attributed the rising number of emotionally disturbed children in part to these early pressures for reading.

According to Durkin (1970), a child does not learn to read all at once; reading is a gradual process. Much of the recent research in this area suggests that it is the acquiring of experience, perceptual skills, and symbolic and abstract understanding that is the gradual process. Weininger (1975c) believes this process begins with the development of the concept of object constancy, through play, by the child during the second year of life, and that this concept must be developed fully before he is able to read formally. A foundation of visual-motor-spatial-linguistic skills must be built up before school entrance. The child must grasp the abstract conceptual definitions of things in the environment. This enables him to use the symbolic approach to problems. Playing and living in his family environment can help the child to acquire visual and auditory discrimination before he goes to school and then he can take books and explore reading, with the teacher as catalyst and guiding person.

Children enjoy playing with the printed word just as they played earlier with objects and with the spoken word. As reading activities are mastered they ask for more, and teachers must anticipate and be ready to meet their needs. By providing adequate grounding before school entrance and then, along with a motivating interest, building carefully on this by allowing the child to approach reading in his own way and without pressure, reading can be made an exciting, relatively rapid and satisfying achievement. This can prevent the several years of anxiety, frustration and misery which many children now experience.

Summary. Children who learn to read easily, regardless of their age, may have varied backgrounds, but certain factors predispose them toward reading. In their homes education is valued, and there are many opportunities for child-adult communication. Relatively quiet activities with almost no television also foster an interest in reading. Within the family, the background, education and behavior of the mother and the interest of older siblings in reading and school have been found to be important influences.

Children who show an interest in reading may learn to read almost spontaneously at an earlier than usual age and without later school problems. They are not likely to push themselves beyond their own abilities. But overanxious adults who apply pressures for early reading, who expect young children to read when their interest is elsewhere, may destroy reading motivation and create so-called "reading disabilities." A supportive environment without pressure contributes more to a child's learning to read than special early training.

Until about the third grade reading is usually a matter of recognizing and discriminating between the appearance and sounds of letters and words. Even when IQ is relatively low, recognition and discrimination can be learned at early ages although it becomes easier as perceptual integration and maturation is achieved. In early childhood IQ seems to be less important for reading than the social-emotional environment. But after the third grade reading takes on meaning, and intelligence becomes more important as knowledge gained from reading must be related to personal experience and understanding.

Children can be taught to read before they have developed an interest in words, or before they have achieved perceptual integration. Their reading skills, however, are soon lost when pressure is relaxed, and their motivation for later reading does not usually return. The disadvantages of early reading persist throughout childhood, and perhaps later, unless the reading was fostered by the child's own initiative without external pressure. At later ages children can be taught to read with relative ease because they have acquired the experience, perceptual skills, and symbolic and abstract understanding needed to apply the instruction and to comprehend the meaning of what they read.

CHAPTER 11

EFFECTIVENESS OF EARLY SCHOOLING

An effective school program will be related to children's present experiences and tasks, and the quality of schooling may be judged by the degree to which it helps students to adapt to extra-school tasks *now*. Activities and learnings focused toward some nebulous success in the future tend to make school ineffective, especially for younger children. These conclusions were reached by Rohwer (1971) after examining research findings related to early schooling programs.

Many studies have been designed to test the effectiveness of instructional strategies and environmental factors on children's learning. The results have shown that children *can* learn at early ages, they *can* be trained to perform fairly complex problem-solving operations, and they *can* achieve IQ gains after participation in school programs (see chapter 8). To make a valid evaluation of the effectiveness of early schooling, however, it is necessary to determine what outcomes are important for the total development of children.

The senior staff of the Harvard Pre-School Project and the Public Education staff of the Ford Foundation (LaCrosse et al., 1970) reported that the available research evidence strongly suggested that childhood was the best time for preventing the stunting effects of environmental deprivation, but what crucial experiences would make possible the necessary development for later success in school were still uncertain. This further suggested that an outcome of early learning experiences (whether in or out of school) should be a firm base which would make later schooling more effective. Preschool and primary programs throughout the country have sought to provide such a learning base. Yet, after all the special methods of instruction and well-planned techniques, massive numbers of children in elementary school still do not learn adequately (Rohwer, 1973).

Although there appears to be a need for compensatory education for some children at some stage of the learning process, there is no final agreement on the effectiveness of many early schooling programs (LaCrosse et al., 1970) nor on the age-appropriateness of present education practices (LaCrosse et al., 1970; Elkind, 1969, 1970, Rohwer, 1971, 1973). It might be hypothesized that the frequent segregation of children into age-groups that are largely isolated from adult activities limits experience with the real world, and perhaps weakens motivation as well. This age-based segregation needs further investigation.

The desired outcomes of early childhood education suggested by these reports are (1) the prevention of environmental deprivation, (2) the development of ability to adapt to out-of-school tasks now, and (3) the establishment of a firm base for successful learning later. Insofar as early learnings contribute to these outcomes, early education is effective. But such research findings do not suggest that early education should be acquired in school. In fact, Hollos and Cowan (1973) concluded that family ethics and values might well play a larger role than language stimulation and schooling in this respect.

In the normal course of events, according to Goodnow and Bethon (1966) children acquire the basic skills for logical thinking in conservation tasks without schooling. These conclusions were based on Goodnow's (1962) work with unschooled Chinese boys in Hong Kong. And Price-Williams' (1961) work among the illiterate Tiv of Central Nigeria suggested that a neurophysiological readiness led to the comprehension of these logical concepts.

In the United States Mermelstein and Shulman (1967) found a similar occurrence among unschooled children in Virginia. Six- and nine-year-old black children from Prince Edward County, a community which had been without public schools for four years, were compared on conservation tasks with 6- and 9-year-old black children who had had regular schooling in an adjoining county. The finding of no difference in performance between the two groups of 6-year-olds was expected. But the fact that schooled 9-year-olds performed no better than the unschooled children indicates that formal, structured learning is not as great a factor as had been supposed for academic achievement in the early years of education, at least up to age 9.

The value of early schooling would seem to come largely from its influence on general development rather than from its "success" in training children to perform certain tasks. Specific training for inducing conservation-type reasoning is definitely questioned by Mermelstein and Meyer (1969). In fact, they suggest that for acquiring some abstract concepts, language and training may interfere with rather than facilitate learning.

There is a pervading tendency to consider schooling effective, especially for the disadvantaged, when children can do what they have been trained to do, whether or not understanding has also been achieved. For example, Deal (1966) noted the improved performance of preschoolers with training and practice on specific mathematics items. But they had acquired no better understanding of number concepts.

A great many studies show learning and IQ gains in the preschool years. Yet disturbing questions remain. Does this early schooling provide the essential base for later school success? Does it increase competence to cope with present realities, or does it further complicate an already complex world? Research related to these questions is sparse, but a few clues are appearing in preschool and kindergarten studies with both disadvantaged and middle-class children.

Preschool for the disadvantaged. The effects of preschool programs on disadvantaged children and their families have been scrutinized carefully to determine the justification for continued support by federal, state and other public funds. After reviewing hundreds of studies, Stearns (1971) summed up these effects in three findings: (1) preschools for the disadvantaged have made positive intellectual and social changes over the short run; (2) there is uncertainty about the effects on children's social and emotional development, particularly over the long run; and (3) participation by parents in preschool programs leads to positive changes in the parents' attitudes toward the school but not in their attitudes about themselves. Since some growth and development was observed in the children, Stearns concluded that such programs might be justified as models for research and reform.

Positive effects of these early childhood programs have also been noted in several other studies. A report on the effects of different Head Start programs from 1966 to 1968 (National Evaluations, technical memorandum, 1972) indicated certain specific benefits for disadvantaged children such as significant growth in the cognitive domain, adaptiveness to the Stanford-Binet test conditions, more verbal activity and social interaction with children of other ethnic groups.

Handler (1972) found that preschool experience was important for the disadvantaged because family socialization patterns did not provide adequate training in school-related skills. And Lessler and Fox (1969) noted a sensitivity and receptiveness to the spoken word as the most significant effect of a Head Start program. This might be interpreted as compensation for a lack in the family socialization.

Results of early school programs have shown that children have enjoyment and enthusiasm for school (Harding, 1966; Lessler & Fox, 1969). And children have made progress in learning how to feel, how to think for themselves and how to make use of themselves in learning. They have learned about themselves and about learning, and have felt good about their early school experience (Sprigle, 1974). Better health and social behavior have also been identified as positive preschool outcomes for the economically disadvantaged (Hulan, 1972). Hulan concludes, however, that there is no instant solution or panacea for the cumulative effects of malnutrition or the lack of infant stimulation and rewarding experiences.

Shortcomings in early childhood programs were also observed by Blatt and Garfunkel (1969) who studied the effects of preschool intervention in the lives of lower class children, hoping to learn what might reduce later intellectual and academic deficits. Their data revealed that an enriched educational opportunity as offered by preschools is not enough. Rather, for disadvantaged children the home setting is a far greater influence than external manipulation of the school environment.

But home environments have been reported at times to have negative effects. In one home-based preschool program of cognitive intervention for children of low-income families, a wide range was found in gains made (Levenstein, 1969). All but one of the seven children who made low gains also demonstrated a common pattern of behavior characterized by social and cognitive immaturity with an indication of unhappiness in family relationships. The home influence was positive, however, for 33 children in this particular program. Parental involvement has been recognized as a vital factor in the present and future academic motivation of children in Head Start programs (Willmon, 1969), and Home Start programs are designed for this family-child interaction (Scott, 1973, 1974).

These findings and programs do not imply that the homes and families of disadvantaged children are all that they might be, even though they do exert a tremendous influence. Indeed, intellectual inferiority has been traced to the lack of opportunity and stimulation so often found in these homes, and compensatory education has been expected to alleviate this lack (O'Brien & Lopate, 1968). But the overriding evidence seems to indicate that "compensatory education" does not fully compensate. It is second best, a substitute for the primary family force in a child's life.

The Head Start program was the first nationwide attempt to promote the intellectual growth of disadvantaged preschoolers. Early evaluations of Head Start indicated that factors which contributed to effective programs were a warm, supportive and stimulating teacher in a task-oriented, academically structured situation with emphasis on verbal development (O'Brien & Lopate, 1968; Blank & Solomon, 1969).

The structure in these programs was necessary if intellectual gains were to be achieved. An investigation by Stephens and Delys (1973) for internal-external control expectancies of lower and middle class preschoolers showed that disadvantaged children *expect* external control. Less structured programs demand the development of internal control, and internal control or self-discipline is a factor in self-confidence for later success in learning. But according to DiLorenzo and Salter (1968), DiLorenzo (1971), and Featherstone (1973), the most effective programs for disadvantaged children are focused toward more immediate cognitive gains with highly structured, teacher-directed experiences.

Bissell (1970) found that the greater a child's socioeconomic disadvantage, the more effective a highly structured program was in producing cognitive gains. The nondirective, less structured programs were more effective with the least disadvantaged. Bissell concluded that the disadvantaged have not developed the resources to learn by themselves in unstructured programs.

The necessity of structuring compensatory programs has also been reported by Clasen, Spear and Tomaro (1969) after a short term, 8-week experiment, and by Larson and Olson (1968) who assessed the effects of an all-day compensatory kindergarten. In this latter case, however, the learning and intellectual growth rates diminished when the focused saturation efforts were discontinued. A follow-through program concept was suggested as a step in the right direction.

It seems that the carefully nurtured gains of these structured preschool programs are often lost unless specific attempts are made to maintain them (Waller & Conners, 1966; Karnes, 1968). In one study of first graders few differences were found between disadvantaged children who had attended a Head Start program with no further intervention and those with no intervention at all. It was concluded that the learning habits of all children are quite developed by age 4, and intervention after that is not really effective without a planned follow-through (Cawley, Burrow & Goodstein, 1970). Activities designed to increase learning capacities through reading readiness instruction and language training produce their most lasting effects when such special programming is continued through kindergarten and into the primary grades (DiLorenzo & Salter, 1968).

A long-term plan designed to keep children in a continuous sequential program through preschool and the first grade yielded significantly greater intellectual gains than traditional school programs. Children who remained in the program longest (2 years preschool, 1 year first grade) achieved the most intellectual growth. Again, the structured nature of the activities and the continuous, follow-through aspect were credited for the positive results obtained (Van de Riet & Resnick, 1972a, b).

Another tightly structured type of preschool program is the academically oriented model designed by Bereiter and Engelmann (1966b, c). Reidford and Berzonsky (1969) field tested such a program for six months and found that children did achieve an IQ gain. Yet the total evaluation of their findings suggested that long-term programs extending through the early elementary school years should replace short-term programs for preschoolers.

The fast pace and intensive drill in the Bereiter-Engelmann program resulted in the rapid attainment of basic academic concepts and an accompanying gain in IQ (Bereiter & Engelmann, 1966a). But there is evidence that this academically oriented approach can cause later difficulties. Miller (1971) compared the interaction of various Head Start curricula with subsequent schooling and discovered that children who had been accustomed to the Bereiter-Engelmann structure appeared handicapped in kindergarten. It is possible that they found it difficult to adjust to the more leisurely pace and individual effort expected in regular school programs. Bereiter (1972) later noted that the structured teaching of cognitive skills does not prepare a child for what lies beyond. He labeled it training rather than education. Its influence on real development was minimal. It appears that the behaviorists think of children almost as though they were experimental animals. They have neglected the children's potential to develop feelings of freedom, independence and self-discipline, and as a consequence their tightly structured programs are depriving children of an opportunity to develop in these respects (Weininger, 1975b).

Along with structure and continuity, the most effective schools for young children have a large proportion of adults available to the children (Spicker, 1971). The personal impact of the teacher is a decisive factor in the effectiveness of programs for the disadvantaged. For young children, teacher continuity is as important as program continuity. The same teacher in a teacher-child ratio of 1 to 5 provides an opportunity to build motivative relationships and to reinforce learning (Hodgins & Karnes, 1966). Even in the elementary school, small group instruction promises greater academic success (Frost, 1967).

A teacher-child ratio of 1 to 1 is even more highly effective in early learning (Palmer, 1968). Positive learning results have been obtained both by tutoring children at home and by teaching mothers to work with their own children on an individual basis (Karnes, 1968). Hamblin and Hamblin (1972) experimented successfully with preschool peer tutoring in a beginning reading program, and for both low and medium IQ children, performance increased with this personal help.

Some programs for disadvantaged children reportedly have failed to produce any particular gains. Asbury (1970) found a specialized training period for a short time did not result in a significant improvement in cognition related to verbal ability. The Westinghouse report (1970) likewise found short summer programs ineffective for lasting gains. In fact, in some Head Start enrichment programs no significant differences were found between Head Start and non-Head Start groups in achievement nor in intellectual ability (Blatt & Garfunkel, 1965; Krider & Petsche, 1967; Cline & Dickey, 1968). In fact, Cartwright and Steglich (1965) reported a non-Head Start control group superior to a Head Start group at the end of both the first and second years of school.

But some tests of disadvantaged preschoolers show improvement in certain areas when no special gain is apparent in intelligence. Sontag, Sella and Thorndike (1969) reported the significant progress of Head Start children in sensory and number concepts and word associations, but no difference in intelligence when compared with non-Head Start children. Saltz and Johnson (1973) observed progress in both social and cognitive development from training in fantasy play and role enactment, but again there was no improvement in intelligence. Higher scores on school readiness tests have also been noted after early schooling (Seidel, Barkley & Stith, 1967; Turner & DeFord, 1970; Moore & Ogletree, 1973), although there may have been no significant gain in IQ (Jensen & Kohlberg, 1966).

Initially low IQ scores of disadvantaged children may not represent a true measure of ability. Thus the mental diversity between children of lower and higher socioeconomic levels may not be as great as it appears, even though dramatic (but pseudo) gains in IQ are likely to occur among the most disadvantaged. One evaluation of an inner-city preschool program (Kraft et al., 1968) indicated that the lower a child's initial IQ, the more likely he was to make large gains after sufficient experience with a preschool program. Children with a low initial IQ made their greatest gains in the second year of the program, while those with a higher IQ and in higher socioeconomic levels achieved the same gains during their first year.

The conclusions of Zigler and Butterfield (1968) raised questions about the authenticity of preschool IQ gains attributed to various programs. The results of a study by Zigler and Butterfield provided evidence that standard testing procedures underestimated the culturally deprived child's intelligence. They suggested that what appeared to be an increase of intellectual ability in preschool children was really a greater ability to use what was already there.

For many disadvantaged children, Head Start programs have contributed to this greater ability to meet the intellectual challenges of kindergarten and first grade (Beller, 1967, 1974; Abelson, 1974). But the dramatic gains of the preschool years were not repeated in early grade school, according to Deutsch, Taleporos and Victor (1974). This could also be indicative of the unrealistically low assessment of intelligence for preschool children who have not yet learned the academic "ropes" used in measuring cognitive ability.

The duration of positive preschool effects on disadvantaged children has been reported to be marginally conducive to cognitive achievement through the first three grades of elementary school (Westinghouse, 1970; Deutsch et al., 1971; Weikart, 1970a, b; Weikart, Deloria & Lawsor, 1974), and it may be evident for four or even five years (Karnes, Zehrbach & Teska, 1974). Weikart and his associates (1974) found that children who had participated in a preschool program demonstrated higher achievement in the first and third grades than a control group, but their higher scores on IQ tests disappeared by the third grade. The children without preschool had begun to "catch up."

A steady though gradual decline in measured IQ begins as early as kindergarten or first grade, even though groups with preschool appear to perform better academically than children with no preschool experience. These non-preschool children, on the other hand, show a gradual increase in IQ throughout kindergarten and first grade (Miller, Louise B., 1972). As a result, most of the positive effects of a preschool program are insignificant after a year or two (Hodges & Spicker, 1967; Dunlap & Coffman, 1970).

Larson's (1969, 1972) findings follow the same trend. Significant IQ gains in a Head Start group in rural Minnesota were stable through grade one. After kindergarten the learning rate of the Head Start children lagged behind those with no preschool, and after first grade those who had attended Head Start performed significantly below control groups on tests of word reading, paragraph meaning, vocabulary and spelling.

Similarly, Van de Riet and Van de Riet (1967) found that children from both an experimental Learning to Learn program and a traditional preschool were superior to those with no preschool in a number of developmental measures. At the end of the first grade children from the experimental program were still superior in IQ, but the differences between the groups had begun to disappear because the non-preschool group had improved.

Although carefully planned intervention may lead to IQ gains and better performance in early elementary school (Gray & Klaus, 1965), differences not only in IQ but also in language and achievement that begin to disappear in the first grade are no longer of any significance by the end of the fourth grade (Gray & Klaus, 1970). Gray (1974) concludes that even the best intervention programs do not make up for an inadequate home or inappropriate school experience. The growing child must continually interact with his immedate environment if lasting changes are to occur.

A synthesis of these research findings suggests that the ability of the disadvantaged child to reach current educational standards depends upon: (1) an external control or structure representing limits concomitant with the child's ability to function; (2) a continuous program that extends into the elementary grades; and (3) continuity and accessibility of adults, whether they be teachers or parents.

When self-discipline or internal control is a goal of education, the external structure can be less rigid. But according to the evidence reviewed here, cognitive gains are then smaller and develop more slowly. Highly regimented programs result in greater intellectual gains, but these gains are relatively impermanent until after the first few years of elementary school. When parents and teachers insist that children learn the basic academic skills before age 7 or 8, then learning situations must be laboriously structured in a way which is unnecessary when children are slightly older.

The effects of such regimented schooling on both cognitive and affective development indicates that the disadvantaged child's real deprivation may arise from a cultural discrepancy that leaves internal control undeveloped within a child, as suggested by Bissell (1970) and Stephens and Delys (1973). Without this basis for self-respect and confidence, motivation often lags. It appears that schools may perpetuate this early deprivation when undue pressure is applied for achievement which has little ultimate meaning for the child because of differences that are cultural, not pathological (Baratz & Baratz, 1970; Rist, 1970).

In commenting on the common characteristics of preschool children from multi-problem families, Friedman (1974) observed that the strong emphasis on cognitive development in their education may be inappropriate to the broader learning process. Friedman's analysis of the early education needs of the disadvantaged pointed out that only when developmental maturation is enhanced and supported can children be helped to acquire the personality and cognitive tools for building satisfactory lives. The real effectiveness of early education lies in released child-potential, not in the quantity of information acquired.

The traditional nursery school. The relaxed, loosely structured curriculum of the traditional nursery school is seldom reported in current research. Such a program has been of little value in helping disadvantaged children achieve cognitive gains (Bouchard & Mackler, 1967). Even with parental involvement and a later enriched classroom experience in the first and second grades, there appeared to be no real gains for the children after three years in a nursery school program at Howard University (Herzog, Newcomb & Cisin, 1974). Nor has nursery school been a determinant of learning for more advantaged children (Handler, 1972). When a relatively high level of proficiency in school-related skills has been acquired at home, a nursery school experience has only a negligible effect on later school achievement, according to Handler.

Before the sharply increased emphasis on early cognitive skills that came about in the late fifties and sixties, nursery schools were of quite a different character than current preschools with their structured programs and academic objectives. Research efforts that focused on traditional nursery schools from the thirties to early sixties regularly revealed no significant intellectual effects on children (Anderson, 1940; Goodenough & Maurer, 1940; Lamson, 1940; Moustakas, 1952; Douglas & Ross, 1964; Palmer, 1966b).

A year of attendance at a superior nursery school produced almost no gains in intelligence scores. This superior program, however, was reported as encouraging independent thinking and intellectual curiosity through challenging experiences (Bird, 1940). Such experiences may have contributed to intellectual development that was not immediately measurable.

The usual outcomes of these nursery schools, especially prior to World War II, were personal and social in nature. Moustakas (1952) summed up their greatest contributions as helping children to develop social skills and emotional adjustment. With nursery school attendance children were rated more sociable (Hattwick, 1946), more successful in social contacts (Mallay, 1935), and more outgoing toward other children (Horowitz & Smith, 1939). Their improved social behavior became more acceptable to teachers and other children (Jersild & Fite, 1939),and solitary play merged into integrated group activities (Parten, 1932) which grew more spontaneous with increased social experience (Skeels et al., 1938). The children tended to "grow up," to be more independent and to show more self-control and self-reliance as they progressed in the nursery school (Joel, 1939; Van Alstyne & Hattwick, 1939).

With increasing nursery school attendance, children scored higher on emotional maturity (Joel, 1939). Those schools judged as better sought to encourage attitudes that would help children handle their feelings (Appel, 1942), but conflicts, fighting and quarreling seemed to increase with length of nursery school attendance (Jersild & Markey, 1935). The children became less sensitive to suggestion or criticism, more active and resistant to authority (Andrus & Horowitz, 1938), but better able to disguise or inhibit the outward expression of their fears (Jersild & Holmes, 1935).

Intellectual development was a controversial question (Goodenough & Maurer, 1940). Some investigators believed that nursery school could influence IQ (Wellman, 1934; Rhinehart, 1942), but others were dubious (Peterson, 1937; Skeels et al., 1938; Page, 1940). The general attitude was that the material increase of the IQ was really not as important as the quality of effective intelligence--original ideas, creativity, productive enterprises, the questions asked and the quality of explanations (Moustakas, 1952).

The effects of nursery school attendance were not too noticeable in kindergarten or elementary school. In the fifties, nursery school children were sometimes perceived by their later peers as more free and sure of themselves (Allen & Masling, 1957). They were more likely to be chosen as preferred playmates (Angell, 1954), and may have been more accepted by their peers (Brown & Hunt, 1961). But kindergarten teachers' ratings for children with nursery school background were actually lower on personal adjustment and relationships with other children. Brown and Hunt recognized that nursery school enrollments may have been influenced by the emotional needs or desires of parents, and poor personal adjustment could have begun before the nursery school experience.

Generally, early nursery school attendance was not significant in social and emotional adjustments several years later (Bonney & Nicholson, 1958; Douglas & Ross, 1964). On tests of intelligence and educational performance, Douglas and Ross found that nursery school children made slightly higher scores at age 8 than their non-nursery counterparts. Their scores were not significantly higher, however, and by age 11 they had lost their advantage. By age 15 the nursery school children were slightly below the average of non-nursery school children. Palmer (1966b) reported findings consistent with these in an evaluation of the effects of a junior kindergarten examined over a five-year period. Again there were early positive effects on achievement, but after four years they had disappeared.

There is a dearth of more recent research on traditional nursery schools. But as noted by Herzog, Newcomb and Cisin (1974) for disadvantaged children, and by Handler (1972) for children of higher socioeconomic levels, this type of program produces negligible cognitive gains. Perhaps for this reason it is bypassed in current research.

A philosophical question. In 1970 the Harvard Pre-school Project and Ford Foundation report on research and educational practice as related to the first six years of life called the attention of educational philosophers to the moral and political overtones in the early schooling movement. They questioned the value of accelerating cognitive development in the preschool years, recognizing these years of a child's life as entities in themselves. Although pragmatic reasons for this unbalanced emphasis existed, these undue pressures were pointed out as a possibly dangerous and shortsighted practice (LaCrosse et al., 1970).

The effects of increased time in school may have negative influences on young children (Husén, 1967; Rohwer, 1971). Witherspoon (1968) found some evidence that both the achievement and adjustment of children through the third grade suffered when the length of the school year was extended.

Robinson's (1973) evaluations of early schooling effectiveness led to the conclusion that intensive efforts to develop academic skills in early childhood are highly correlated with frustration, anxiety, and apathy in later school years. The cognitive focus has fallen far short of producing significant and consistently sustained gains. And Rohwer (1971) observed that even when early schooling had apparently enhanced performance in school, performance in life was not adequately realized.

Summary. Early childhood is the best time for preventing the effects of environmental deprivation and for establishing a firm base for effective learning in later years. There is uncertainty, however, as to what crucial experiences are necessary for these outcomes. Compensatory education is needed by some children at some time; yet there is a lack of agreement concerning the long-range benefits of present early schooling programs.

For disadvantaged children preschool experience has resulted in short-term intellectual and social benefits, but there is uncertainty about long-term effects. Parent participation improves attitudes toward school, but does not change parents' attitudes about themselves. This finding needs careful consideration since parents' self-concepts affect children's self-concepts, and this has a tremendous influence on learning achievement.

Much early schooling is expected to compensate for a lack in family socialization, but it does not fully compensate for a strong family force in a child's life. Children from disorganized family systems do not develop the internal control and motivation for normal learning, so an external control is supplied in a carefully structured school environment. This makes possible the desired cognitive gains but still does not provide the necessary internal motivation for self-initiated learning, so gains are inevitably lost unless the external structure is continuously maintained. Small group instruction with the same teacher in a teacher-child ratio of 1 to 5 or fewer can help build motivation; but continuity is also required, and school programs seldom provide the necessary long-range relationships.

IQ gains achieved by preschoolers appear to have questionable authenticity since the lower a child's initial IQ, the greater gains he is likely to make after sufficient experience in a preschool program. Such IQ gains may really be a greater ability to use what was already there. These dramatic gains are not repeated in the grade-school years; in fact, a steady decline in IQ has been noted when preschoolers enter elementary school so that the positive effects of preschool are insignificant after a year or two.

Traditional nursery school programs with a relaxed structure have been of little value in promoting cognitive gains for either disadvantaged or other children. The emphasis of these schools has usually been social and developmental with no special efforts to hurry intellectual attainments.

A very real deprivation and disadvantage for any child arises from a family structure that leaves internal control and motivation undeveloped within him. Early schooling may attempt to remedy the problem, but it does not compensate for the lack in the home and family. Emphasis on family rehabilitation could be a more logical focus than early schooling for ensuring the learning and personal development to which every child has a right.

CHAPTER 12

A POSITIVE APPROACH TO EARLY LEARNING

Experimentation with the philosophies of early childhood education goes back more than 200 years (May & Vinovskis, 1972). Jean-Jacques Rousseau initiated educational reform in Europe with the publication of Emile in 1762, teaching that children should begin to develop the skills needed to understand the world and to shape their own future.

Rousseau's ideas that education should be appropriate to a child's development influenced Johann Basedow in Germany, who established a school in 1774 where he sought to stimulate children's reasoning faculties rather than memory only. From 1784 to 1808 Gotthilf Salzmann, also in Germany, advocated the influence of a natural environment in the country and in Switzerland Phillipe de Fellenberg added agriculture and manual labor to his country program, founded in 1804. Such educational opportunities became available to poor children in the 1770's when Friedrich Von Rochow worked to bring schools, teachers, and textbooks to the peasants on his estate near Berlin (Pollard, 1974).

Infant schools, kindergartens, and nursery schools. The Swiss educator, Johann Pestalozzi, was especially interested in the development of the infant mind and encouraged an early learning of vocabulary through familiarity with materials and objects in the child's natural environment. According to Pestalozzi, the home was the only appropriate place for such early learning, and the mother was the best teacher (Pestalozzi, 1898).

The history of the infant school movement in America, reviewed by May and Vinovskis (1972), provides a parallel perspective for examining early education today. A general public interest in the early education of poor children can be traced to the English infant schools, starting in 1816 with the school founded by Robert Owen in New Lanark. In little more than a decade America followed the English example and organized infant school societies in New York City, Philadelphia, and several other cities. And by 1828 a number of infant schools were founded in and around Boston, which became the center of the infant school movement in America.

These schools were organized primarily to give religious and educational instruction to children from "unfavorable situations" (Boston RECORDER AND SCRIPTURAL TRANSCRIPT, July 9, 1829), although some private infant schools were established for children of the better classes. This early education of the poor was meant to be the means of permanently eliminating poverty.

In 1833 Amariah Brigham startled the infant school advocates and the public as well by the publication of his Remarks on the Influence of Mental Cultivation and Mental Excitement upon Health. This book stressed the necessity of giving more attention to health and physical development in early life with less emphasis on the cultivation of the mind. The Infant School Society tried to explain its position as more of a neighborhood nursery than a school, but enthusiasm rapidly declined and the schools soon ceased to function.

The kindergarten movement of the 1860's and 1870's, influenced by the Froebelian curriculum (Froebel, 1896) of games, songs, and nature study, appeared to flourish with greater public support than had the earlier infant schools. Again the major objective was to alleviate the problems of the underprivileged population by relating education to child development needs. But now, in addition to the problems of poverty, urbanization and industrialization, a new need was evident in the U. S.--the acculturation of the children of immigrants into American society. In 1874 the National Education Association recognized the work of kindergartens and established a special department for them. Soon the NEA recommended that kindergarten programs be a part of the regular public school system.

Nursery schools, like the infant schools and kindergartens, were originally concerned with the health and welfare of poor children. In 1911 Margaret and Rachel McMillan, two sisters generally credited with the nursery school idea, sought to provide in their London nursery school the qualities of a child-rearing environment available in more affluent homes (McMillan, 1919). Four years earlier in 1907, Maria Montessori had begun her work with slum children in Rome, using the idea of a prepared environment to capitalize on the potential of children in their early years (Rambusch, 1962).

After World War I the interest in child development and the programs operated in child-study centers in a number of U.S. universities (Anderson, 1956) tended to popularize nursery schools. For the first time early childhood programs were established for a purpose other than the immediate alleviation of social ills. The health and happiness of children received due consideration; nevertheless, longitudinal efforts to learn more about children and their development were an integral part of these research-oriented nursery schools (see chapter 1).

Federal legislation under the WPA program of the depression years in the 1930's and government subsidies for nursery schools during World War II (Frank, 1962) made early education programs available to poor children. But aside from these emergency periods, nursery school in the United States was limited largely to children in the middle and upper socioeconomic levels of society until the mid-1960's.

Parents concerned with their children's socialization and adjustment in an increasingly complex society were the ones who sought the advantages which good nursery schools were assumed to provide. Kanter (1972) examined the standard routine of the nursery school experience and concluded that it was indeed a socializing situation, but it was oriented to bureaucratic reality rather than to the individual needs of the child. Kanter observed that nursery school children learned little personal responsibility, participated in highly routinized play without internal motivation, and accepted impersonal principles for relating to others. The school had created a world resembling a large scale formal organization (bureaucracy), and the child became an "organization child" with adaptive techniques to maintain status but little initiative for individual achievement.

Rationale for early childhood schools. The betterment of society has routinely been the common thread running through the various movements concerned with the education of young children (May & Vinovskis, 1972; Spodek, 1973; Pollard, 1974). Experimenters and social reformers have provided schools for children when homes were deemed inadequate, but philosophers like Rousseau have maintained that homes are generally advantageous for early child rearing and training.

The scholars and social reformers of the 1960's who proposed early childhood education programs to remedy the problems of disadvantaged children in the United States were not advocating something new. The rationale for these programs, however, was apparently based on more concrete evidence than previous early childhood movements. Bloom (1964, 1965) pointed to evidence from studies of child development, of the home environment and of intellectual abilities showing that development in early childhood was crucial for later educational achievement. Although early development is certainly important, critical analyses (Jensen, 1969; Bayley, 1970; Elkind, 1969) of Bloom's position raised questions as to the adequacy and correctness of his interpretation. On the basis of his findings, however, he proposed large scale nursery school and kindergarten programs as the best solution to underachievement.

Bloom (1965) suggested that early childhood programs be made available first for disadvantaged children, but eventually for all children. He concluded that it was very unlikely that parents, particularly those of culturally deprived children, would be able to provide adequately for the developmental needs of their children, and an important task of the schools was to help parents and supplement their efforts.

Current goals for early childhood education. The problems of disoriented families in the wake of industrialization and urbanization are perhaps more intense today than in the days of infant schools and the early kindergartens. A complex technology has produced an impersonal society that often undermines feelings of self-worth and relationships with people. A study of the research relating to early childhood in today's society shows clearly that a child's early education should contribute to self-fulfillment in the broadest sense (Butler, 1971) with an ultimate goal of achieving a wholesome sense of self-worth and a regard for others (Gordon, 1972a).

There is an urgent need to humanize preschool education with more attention directed to the day-to-day quality of life and less to program outcomes or results (Katz, 1973). The core of this quality of life is the self-concept, and Katz assigns high priority to the goal of helping children achieve a positive self-concept by feeling respected and loved. She points out that the basic criteria by which children judge themselves are acquired very early within the family, and it is more important for a child's total growth to measure up to the family's criteria than to school expectations. It is therefore important that adults accept children's differences and treat their feelings with respect.

Gordon (1972a) also emphasizes the self-concept as the primary purpose of early childhood education. He identifies the child's search for coherence, for meaning in his world, as central to his total development. When a child can achieve harmony with himself, with others and with nature, then he is in an optimum situation for learning. When early education involves school as well as home, then parents and teachers must work closely together supplementing and complementing each other. Gordon concludes that children gain most from such experience when school and home values are in harmony.

To support a positive self-concept, specific goals to be achieved in early childhood education have been identified by Gordon (1972b) as the development of (1) a questioning, open attitude, (2) a respect for self and others, (3) a sense of competence, (4) a sense of responsibility, and (5) a sense of commitment. And once more Gordon emphasizes that family factors, especially parental openness, support, respect and sharing, help children attain these goals. He states that parents and families need to be educated to believe in their own worth.

These goals for personal development in early childhood--fulfilling the needs for attention, affection, and feelings of warmth and acceptance--are basic for early learning and for motivation in future learning. In fact, Zigler (1968) concludes that an overemphasis on the intellectual aspect of child development is harmful when these crucial areas of personal development are ignored. Zigler points out that learning is an inherent feature of being human, and when appropriate conditions are established for general development, a child will learn. Conversely, learning can be inhibited by inappropriate conditions that create an artificial environment (Carpenter & Shipley, 1962), confuse a child's values (see chapter 3), or detract from a child's sense of personal worth (Purkey, 1970).

The caring function, the providing of love, attention, and appropriate activities and services are far more important goals of early childhood education than the acquisition of information or cognitive stimulation (Bereiter, 1972). Schools reflect intellectual abilities; they do not create nor even necessarily develop them,and Bereiter as well as Elkind (1969, 1970), Robinson (1973) and Rohwer (1971, 1975) recommends that schools for young children drop their efforts to direct or shape intellectual development, even into the elementary school.

Priorities in early childhood education. Regardless of funds available and approaches used, the early childhood education programs generally available today are not meeting the needs of children nor correcting the results and failures of child rearing practices in children's early years (Schaefer, 1972b; White, 1974). It seems that priorities have been skewed, and the assumption has been that children become educated through contact with a professional in a classroom or a center. After 16 years of full-time research with children under six years old, White has concluded that the family is the primary educational delivery system. He believes that the highest educational priority in the nation should go to the family, not to developmental day care centers nor to any of the preschool programs that abound.

Our educational priorities are in need of reassessment, with programs for parents and future parents receiving first consideration rather than focusing efforts directly toward children (Schaefer, 1972b; Burton White, 1973, 1974). Strengthening the family for its role in the rearing and education of children, and monitoring the development of children through medical, psychological and educational resource centers and home-visiting programs have been proposed by Barbrack and Horton (1970), Gray (1971) and White (1974) as a far less costly and more productive means of early childhood education than generally out-of-home programs.

According to White (1974), developmental day care costs an average of $2,000-$3,000 per year per child, while parent education and parenting assistance for home education of children might be accomplished for $300-$500 per year per family. In 1970, Barbrack and Horton estimated that the average cost per child for a home visitor program over a five-year period would be less than $325 per year. And as families become more capable of providing for their own children, the need for assistance might be reduced (Gordon & Guinagh, 1969). This would reduce costs even further. Rothman (1973) has suggested the establishment of a generous family assistance program, funded by federal or state funds, so that the poor need not be coerced into using day care centers.

Primitive societies educate their children almost entirely at home, although they often do have a formal type of education when childhood is about over--puberty rites, etc. But in technological cultures even early education tends to become totalitarian--something imposed from the top downward with parents having progressively less control over their children's education. There is need for parents as well as society to reorder their priorities and to plan for time with their children to give them the confidence and security they need (Suviranta, 1973). Suviranta sums up the situation by urging the recognition of parental duties and responsibilities and of the psychological and emotional impact of the home.

Parent education. The necessity of continuous early education for young children is confirmed by a large body of research, but research also confirms the fact that parents are the most influential educators of their own children (Schaefer, 1969, 1973). What parents do in a child's early years in managing the environment, being models for the child and giving information, both directly and indirectly, influences a child's intellectual performance during these years and later on in school (Gordon, 1972b). Both parents have a great influence, but educators are discovering in programs for young children that it is the mother who has more influence on a child than anyone else (Jester, 1969).

From findings such as these, Schaefer (1973) concluded that the education profession can best serve children by training and educating parents to care for and educate their own children. This supports Burton White's (1973, 1974) thesis that parent education should receive top priority in education planning, and Gordon's (1969) conclusion that parent education is an effective means for bringing about social change.

Parents need not be highly educated themselves. Successful parent education programs have been conducted by paraprofessionals (Gordon, 1969; Gordon, et al., 1969). It is the quality of family interaction that makes home education effective (Schaefer, 1969), and many parents are already doing the right thing (Gordon, 1972a). From a study of parent education using disadvantaged women to instruct indigent mothers in caring for and working with their children, Gordon (1969) concluded that *how* a child is taught may be more important than *what* he he is taught. He observed that as the mothers' competence and sense of personal control increased, so did the development of their infants and children improve.

In addition to giving parents confidence and personal competence, White (1974) stressed the importance of educating parents to understand how children develop physically and socially, how to provide safety and security within the home environment while leaving children free to explore and satisfy their developing curiosity about the world.

White (1974) suggested required courses for parent education in high schools, high-quality public television programs, video-cassette or filmed mini-courses in hospitals, adult education courses and neighborhood resource centers for low-cost early detection and referral services to identify children's educational handicaps. The resource centers and home visiting programs would also provide medical and educational assistance to parents as their children develop. Experimentation with programs of this nature are encouraging. Already the home visitor-parent education approach, using non-professionals as educators, has proved unusually successful in producing long-term effects upon children's intellectual performance (Gordon, 1973).

Learning at home. When parents become aware of their worth and responsibilities as teachers of their own children, even a very simple home with meager resources can be a stimulating place for learning. Ordinary household items offer many kinds of sensory experiences, and participation in simple household tasks not only provides opportunities to improve motor skills but also helps to develop a sense of responsibility and of personal worth in the child (Bell, 1973; Moore & Moore, 1975).

Programs to bring child development services to children and families in their own homes is based on this recognition of the home as a primary learning center (Zigler, 1971; O'Keefe, 1973). Through paraprofessionals trained as home visitors, Home Start* has successfully served children from a wide variety of cultural and ethnic backgrounds--white, black, Eskimo, Navajo, migrant, Spanish-speaking, Chinese, etc. It has sought to assess nutritional and health needs, to provide information on nutrition, sanitation, safety, and early childhood development, and to provide direct health and social services or referrals when necessary. It has taught parents to use ordinary materials in the home or items from toy-lending libraries to expand the learning resources available to their children.

The Home Start program has shown that families definitely want to be a part of a program which supports their own relationship to their children (O'Keefe, 1973). It enhances the quality of children's lives and provides a base for learning by building upon existing family strengths (Home Start: An overview, 1973). Centering the program in the home was designed to produce a better quality program with more comprehensiveness for children's development and learning than was possible with the Head Start type of program (Kapfer, 1972).

Independent smaller experiments with home-centered learning have also been successful in helping parents to recognize themselves and their homes as important educational resources for their children (Guernsey, 1972; McNally, 1973.) Guernsey (1972) reported some difficulty for working mothers who wished to participate in the program. This, of course, is a matter of priorities, not only for the mothers who find it necessary to work but also for the society that expects them to assume additional roles.

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*Home Start is an outgrowth of Head Start that uses the home as a learning center.

Young children who learn at home apparently have an emotional advantage over those who have some kind of early schooling. Weininger (1974) reported the results of different learning experiences on five groups of young children matched for age, socioeconomic status, and intelligence. Four groups were in some kind of classroom situation, and one group remained at home. After six months all of the children had made about equal intellectual progress, but the "at home" group showed the best emotional growth.

Simpson (1973) sees possibilities in the home as a learning environment throughout a child's education. She points out the opportunities for developing the child's concept of work and leisure at home, and for learning occupational competencies. The learning of ethics, morals, management of resources, and preparation for responsible parenthood could all be home-based. According to Simpson, this could greatly supplement the role of the school and increase its effectiveness.

Delayed academic skills. A positive approach to early learning should make possible the optimum all-round development of children. The weight of evidence from both research and practice reviewed thus far places the home and family well ahead of the school for assuring such development for most young children. What then is the role of the school in the child's total development?

Schools can provide surrogate care and training for young children when homes are totally inadequate or when parents are personally unable to fulfill their responsibilities. But research has raised the question of whether intellectual competence in early childhood, or even in elementary school, is necessary or desirable for eventual competence in later education and in life (Rohwer, 1971). Experiments with paired associate learning led Rohwer to the conclusion that learning skills are more easily developed through training during adolescence than in early childhood. While the base for developing learning skills is acquired from the environment and from the experiences and relationships of early childhood, according to Rohwer's findings the ability to make use of formal instruction and to retain abstract content is not achieved by most children until near the end of childhood or in early adolescence.

Rohwer (1973) envisioned an elementary school in which academic failure would not exist because the children would work on projects or topics using non-academic resources. Then, in the junior high school years "all the learning necessary for success in meeting high school demands [could] be accomplished." Rohwer (1973) also expressed the belief that delaying formal instruction until the early adolescent years would increase the ultimate degree of academic success and decrease the negative attitudes toward school that appeared to develop in proportion to the years spent in school (Husen, 1967; Rohwer, 1971). Such a proposal could have further merit in that it would avoid the "intellectual burn" of children who struggle to keep up with academic activities before they are ready for total intellectual involvement (Elkind, 1969).

Based on the conclusion that compensatory school programs focused on the primary grades have not produced significant or sustained cognitive gains, and that intensive efforts to develop academic skills in early childhood appear to be correlated with apathy and reduced academic accomplishment in later school years, Robinson (1973) also proposed early adolescence as the best time for academic learning. This could be especially advantageous for deprived children whose cognitive skills have developed slowly.

Proposals like this do not mean that no attention would be given to children's learning prior to their adolescent years. It is quite probable they would receive more satisfying attention than in traditional school programs, but the emphasis would be on physical health and affective, motor, and perceptual development. With such a foundation, cognitive skills could be acquired easily and rapidly, even by children who would normally find school achievement difficult. This would be especially true if the usual lock-step progress through elementary school were not required (Raymond Moore & Dennis Moore, 1972; Raymond Moore & Dorothy Moore, 1975).

An ecological commitment. Schaefer (1971, 1974) points out the need of support for family care and education of children in order to maintain a life-space or ecological perspective for child development. The current focus upon professional and institutional resources for developing the individual apart from his family and cultural heritage has sometimes produced personal isolation. Families, however, are not always adequate for the job without some assistance. A focus upon the development of children within a family and community network or system would provide more supportive relationships (Schaefer, 1974).

Crowded urban areas and family disintegration have contributed to personal isolation. Cities have become places where people learn to live without natural resources, where the rights of children are minimized and a deteriorating environment influences human development and behavior (Bauch, 1971). The major influences on learning in early childhood grow out of a child's total ecology--the immediate home and school setting and the larger geographic setting and social system which affect the immediate setting (Bronfenbrenner, 1974), and positive progress in learning and development for all children depends on an integration of these factors.

Summary. During the last two hundred years a number of movements have attempted to improve social conditions by providing schools for children from "unfavorable situations." As society became more complex in this century, more affluent parents sought nursery school experience for their children because of its presumed social advantages.

The present concern for early childhood education is not a new phenomena, although many advocates claim it is based on more concrete evidence than previous early childhood movements. The problems of disoriented families are more intense today, and technology has produced a society that tends to undermine feelings of self-worth and interpersonal relationships. These problems need attention. For children to achieve self-worth, however, it is more important that they be able to measure up to the family's criteria than to school expectations.

The family is the primary educational delivery system for young children and should have the highest educational priority in the nation. Programs for parents and future parents must receive first consideration rather than massive out-of-home programs for children. Family education has been projected as far more productive of desirable child development and far less costly than public care and education of young children. Parents and society must reassess their priorities, and they must recognize the responsibilities and duties of parents as the most influential educators of their own children in their early years.

Schools perform an important societal function for children who are able to make use of formal school instruction and retain abstract information. This ability is greatly accelerated near the end of childhood or in early adolescence, and much of what is expected in earlier schooling must be learned by tedious repetition or with unnecessary struggle. Intensive efforts to produce cognitive gains in early childhood tend to be correlated with apathy and reduced academic accomplishment in later school years.

A positive approach to early childhood education suggests an ecological perspective for child development in relation to the family, the community and the total culture, with priority given to education for responsible parenting. Community resources can enhance the development of children without dividing them from their families. Rather, families can be helped to provide for their own children's needs whenever possible.

CHAPTER 13

EARLY CHILDHOOD EDUCATION: ISSUES AND RECOMMENDATIONS

Many issues have emerged from this review. Some are more clearly defined than others, but most of them are interrelated. For the most part the studies tell their own stories, and comments have been reserved for summaries and areas in which clarification was needed. These early childhood education issues are basic to the stability of society. It is both necessary and urgent that conventional wisdom, traditional practices and current trends be evaluated against the questions and evidence arising from early childhood research. While some critics have insisted that there is much evidence contrary to the findings of this review, they have not yet made it available. Certain key authorities on early childhood education (ECE) literature say that it does not exist.

In recent years, thoughtful early childhood education specialists who had strongly supported early schooling have reversed or sharply modified their positions because of the results of their own research and that of others. An overview of the entire early childhood problem suggests certain ECE issues which deserve careful and objective study.

Family restoration or personal accommodation. We must determine whether or not we shall appropriate established facts of human ecology to restore family life or to accommodate those who may place personal expedience and conventional practices ahead of family welfare as, for example, sending children to preschool because it is in style or convenient. To follow a trend that leads to negative outcomes is defeatist and uncharacteristic of a progressive people.

Home or school as the basic ECE delivery system. The school and other out-of-home care for young children must be evaluated against parent and home education. Out-of-home care must be provided for children whose parents cannot care for them, whether for physical, emotional or financial reasons. Yet, wherever practical, as pointed out by Nimnicht (1972), White (1974), and others, the home should be the primary ECE delivery system. Such a philosophy and practice need not deprive present preschool personnel of employment as is so often feared. Some teachers need to change their focus from the schoolroom to the home or to parent groups. Parents need to be educated regarding the developmental needs of their children and how best to meet these needs. In any event, the child's welfare must transcend employment concerns of teacher groups, and should be carefully weighed in making decisions for parental employment.

Family authority and responsibility. Who is primarily responsible for children? Assuming that authority and responsibility are commensurate, we are led to conclude that if parents are to have authority over their children, they must also accept responsibility for them. To the extent that parents delegate this responsibility to others, they abrogate their authority. Suviranta (1973) has noted that this shift of responsibility has already gone so far that education is in danger of becoming totalitarian with parents having few rights, even when the best interest of the child is at stake. In recent months and years a number of American mothers have been arrested, and one recently jailed, for conscientiously keeping their children at home at ages six or seven. This appears to be a violation of constitutional freedom, if not of motherhood.

Freedom for parents or children. This should never be *an* issue, but it is. Mothers sometimes desire freedom from home duties, including child care, in order to work or otherwise be at liberty. For some this is financially necessary, but for many it is not. In some cases the father's employment may be subject to question. The question, however, remains. If the child's best interests require a warm, responsive parent, does it become a violation of *his* liberties to have the parent unnecessarily abrogate his responsibilities? Is this really parental freedom? Or is this license? If a child's freedom to develop into a productive person depends substantially on the quality of his parental attachment, does a lack of attachment impose an unnecessary limitation on the child's freedom? The issue is a poignant one when policy permits or encourages parental self-interest in the face of the child's helplessness.

Care of privileged or underprivileged. Children of the poor or underprivileged more often need carefully planned, out-of-home care than do the children of more affluent families. But some people insist that if public funds provide special services for the poor, they must also be available for all children. This reasoning, if logically extended to all areas of welfare, would ultimately lead to a total, and fiscally improbable, welfare state. Even now, according to the WALL STREET JOURNAL (August 6, 1975), "There are already more Americans (80.6 million) being supported by tax dollars than there are workers in the private sector (71.6 million) to support them."

Home or school socialization of the child. One commonly advanced rationale for early schooling is that it socializes young children. This idea needs to be carefully examined, for the facts appear to indicate otherwise. According to accumulated evidence from comparative entrance age studies, children who start early to school are often found to be socially immature.

Approaching the problem from another point of view, teachers have subjectively found that early school entrants are more likely to have social maladjustment problems as they progress through school. The belief that young children need more social opportunities than can normally be provided by a combination of parents, relatives, and neighborhood friends does not seem to be supported. In fact, in urban, suburban, rural, and even remote areas it appears that most children develop better socially at home than in school. Exceptions, of course, may be those homes which cannot provide reasonably sound parenting because of severe physical, emotional or financial difficulties--or parents may be ignorant or apathetic. Often overlooked is the child's equally important need for solitude to work out his own fantasies--a basic activity for true sociality.

The child's need for cognitive stimulation. Another of the most frequently heard reasons for early schooling is the mental stimulation it provides. This concern is not consistent with research findings related to early learning. If, as neurophysiologists suggest, brain structure and function move along together, it would seem that to require a child to undertake tasks for which he is not fully prepared may be risking damage to the central nervous system, as well as potential difficulties in the affective and motivational aspects of learning. Recent findings in the area of neurophysiology, cognition, vision, hearing, etc., have raised serious questions about expecting children to pursue the basic skills of reading, writing, and arithmetic on a deliberate academic basis before they are 8 or 10 years old, and their neurological, cognitive, and affective development has reached reasonable levels of maturity--an integrated maturity level (IML) or safe time for school (Moore and Moore, 1975).

If we expect a quality of reading and arithmetic based on understanding rather than rote learning, delay in these areas appears wise. Some scholars conclude that it would be better to wait until ages 10 to 14, or early adolescence (Elkind, 1969; Robinson, 1973; Rohwer, 1971). Freedom within limits that permit the child to explore and test his own ideas appears to offer the best kind of "stimulation" most children need. There is strong clinical and research evidence that childhood motivation for learning is often destroyed by early exposure to the so-called stimulation of school. And by grades three or four many children find themselves on a motivational plateau and never recover their early excitement for learning.

Children's attitudes toward school. Many parents think their young children are excited about school. This suggests many questions. Do children really enjoy school more than home? If they do, why? What of the quality--warmth, consistency, responsiveness--of the home compared with the school? Are homes really lacking in things that can interest young children? Or is it the social and psychological pressure of everyone doing it that encourages early schooling? Studies clearly indicate that the earlier children go to school the worse their attitudes eventually are toward school, particularly as they enter their teens (Husén, 1967; Husén, 1972; and Liljefors, 1974). On the other hand, much experimentation is due with parents and homes in order to provide sounder bases for parent education.

Structure or freedom in the young child's learning. While many preschools presumably have an unstructured curriculum, most are readiness-oriented for reading, writing, arithmetic, language arts, etc. Research apparently indicates that structure or regimentation are helpful if one is determined to teach academic skills before the young child is ready. This is much like the formality of holding a young child up by his hands in order to help him to walk before he is ready. The question here is, why make him walk? If we are not worried about rushing a child into the basic skills, a virtually unstructured program with warmth, consistency and concern for the development of a sound system of values but without a particular orientation to basic skills, appears to provide the best readiness for learning.

Parents as teachers. An alarming number of parents appear to have little confidence in their ability to "teach" their children. Research suggests that their ability to care is the criterion of parenthood during the early years. Parents should be helped to understand the overriding importance of incidental teaching in the context of warm, consistent companionship. Such caring is usually the greatest teaching, especially if caring means sharing in the activities of the home--which for the young child represents his foretaste of mature living.

No evidence has been found for the common assumption that teachers can out-parent parents, as a general practice.

Natural and enriched environments. There is reason to question an emphasis on special materials and equipment for learning in a child's environment. A clutter of toys can be more confusing than satisfying. On the other hand, natural situations with opportunities to explore seldom overstimulate or trouble a small child. Furthermore, most children will find greater satisfaction and demonstrate greater learning from things they make and do with their parents or other people than from elaborate learning materials.

Cost of effective child care. An appropriate adult-child ratio is vital for children's development and learning (Meers, 1970). But the cost of providing the number of adults necessary for the optimal care of small children is high. Excellent parent and home education programs have been implemented, however, at much lower costs than well-planned preschool or day care programs.

There are costs in child services that sometimes lead to confusion between educators and social work personnel and between the relative responsibilities of family physicians and publicly provided medical care. The costs of child care and child services must be evaluated from professional perspectives rather than political. Otherwise the entire early childhood program may well be sacrificed (White, 1972).

School entrance age. The evidence overwhelmingly favors later entrance for most children. A non-graded primary room as a screening, adjusting facility for children of varying degrees of physical and cognitive maturity would normally appear to be the most efficient means of handling 8-year-old school beginners. Some would already know how to read but would be unable to write or do formal arithmetic, and some would have had no background in these skills.

Letters from nearly 300 correspondents who have entered school at age 8 or later indicate that even in conventional school programs average youngsters can quickly progress and catch up with those who started school several years earlier--in motivation, achievement, behavior, sociality and leadership. When they enter school these older children should normally be placed with their chronological and/or maturational peers.

There are many variations in state school laws, mandating enrollment anywhere from 8 years down to 5 3/4 years or younger. Seldom do they provide for the later maturation of boys, but dropout and delinquency statistics suggest that boys are disadvantaged by such laws. Either such laws should be tested at highest juridical levels, or a national law should be enacted setting general enrollment-age parameters, consistent with systematic research evidence.

Differentiating treatment of various socioeconomic levels. As pointed out earlier, it appears impractical to demand the same tax-supported assistance for middle and higher SES groups as may be necessary for those in poverty. Such an attempt carried to its ultimate logical conclusion would result in a welfare state. Some special services such as medical and psychological screening, are better handled for all children by public health or other agencies. But general early childhood assistance should be reserved for those who are incapable of providing it.

Successful parenting, however, is not limited to middle or upper income groups. There are indifferent parents at all levels of society, and some of the best parents are found among the economically disadvantaged. So any plan for parent education, while first perhaps considering the poor, must not overlook the others.

School and community parent education. It is imperative that there be close cooperation between the schools and other community agencies for good parent education programs. Whether the primary responsibility is assumed by the school or by a community agency, the development and needs of children must be the central focus of such education.

Research analysis and application. There is serious need for long-range ECE studies which project present practices ten or fifteen years or more. With only occasional exceptions (Davie, Butler & Goldstein, 1972; Mawhinney, 1964; Forester, 1955), ECE studies have covered relatively short time spans.

Appraisals of Headstart and other programs have often been inconclusive for this reason. Meanwhile the synergic effect of analyzing and interrelating studies from the several ECE areas may provide much information of value.

To gain as much understanding as possible of the real issues involved, research must be interrelated from all areas pertaining to the problem. At the same time, an effort should be made to simplify explanations and clarify the findings. The use of complex or peculiarly professional terminology to obscure the message must be avoided. Data from carefully controlled studies can thus be available to educational planners and policy markers. At times even clinical data, when carefully evaluated, can provide clues for further study and action.

Finally, it has long been assumed that researchers should not be advocates; that advocacy dilutes objectivity. Perhaps this was wrong, for this assumption seems to be one of the reasons that ECE facts from the various disciplines have been so scantily interrelated and poorly communicated. Truth is often threatening to those who find security in conventional practices. Yet when expedient ways and conventional wisdom are subjected to honest scrutiny, their basic qualities are revealed. Such scrutiny is necessary if ECE research is to benefit children fully. The trends of the times which do not clearly serve the needs of children must be reevaluated and, where necessary, policies and practices must be altered if children are to realize their maximum potential. Attention to the total development of children is insurance for the healthy survival of our society and of civilization.

REFERENCES

Abelson, W. D. 1974. Head Start graduates in school: Studies in New Haven, Connecticut. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 1-14. Washington, D. C.: Office of Child Development.

Abramson, P. R. 1973. Familial variables related to the expression of violent aggression in preschool-age children. JOURNAL OF GENETIC PSYCHOLOGY 122:345-346.

Aguilar, M.J., and Williamson, M.L. 1969. Observations on growth and development of the brain. In Human growth, ed. D. B. Cheek. Philadelphia: Lea and Febiger.

Ahr, E. A. 1967a. The development of a group preschool screening test of early school entrance potentiality. PSYCHOLOGY IN THE SCHOOLS 4:59-63.

________. 1967b. Early school admission: One district's experience. ELEMENTARY SCHOOL JOURNAL 67:231-236.

Ainsworth, M. D. S. 1963. The development of infant-mother interaction among the Ganda. In Determinants of infant behaviour II, ed. B. M. Foss, pp. 67-112. London: Methuen; New York: Wiley.

________. 1969. Object relations, dependency, and attachment: A theoretical review of the infant-mother relationship. CHILD DEVELOPMENT 40:969-1025.

________. 1972. Attachment and dependency: A comparison. In Attachment and dependency, ed. J. L. Gewirtz, 97-137. Washington, D.C.: V. H. Winston & Sons, Inc.

________. 1973. The development of infant-mother attachment. In Review of child development research, eds. B. M. Caldwell and H. N. Ricciuti, vol. 3. Chicago: University of Chicago Press.

Ainsworth, M. D. S., and Bell, S. M. (no date) *Mother-infant interaction and the development of competence*. ED 065 180.

Alexander, F., and Staub, H. 1931. *The criminal, the judge, and the public.* New York: Macmillan.

Allen, F. H. 1958. The dilemmas of growth--for parents and children. CHILD STUDY JOURNAL 35:4-7.

Allen, G. B., and Masling, J. M. 1957. An evaluation of the effects of nursery school training on children in the kindergarten, first and second grades. JOURNAL OF EDUCATIONAL RESEARCH 51:285-296.

Almy, Millie, et al. 1969. *Logical thinking in second grade.* ED 033 747.

Ames, L. B. 1963. Usefulness of the Lowenfeld mosaic test in predicting school readiness in kindergarten and primary school pupils. JOURNAL OF GENETIC PSYCHOLOGY 103:75-91.

________. 1969. Children with perceptual problems may also lag developmentally. JOURNAL OF LEARNING DISABILITIES 2:205-208.

Ames, L. B., and August, J. 1966. Comparison of mosaic response of Negro and white primary-school children. JOURNAL OF GENETIC PSYCHOLOGY 109:123-129.

Ames, L. B., and Chase, J. A. 1974. *Don't push your preschooler*. New York: Harper & Row.

Anastasi, A. 1958. Heredity, environment, and the question "how?" PSYCHOLOGICAL REVIEW 65:197-208.

Anderson, J. E. 1956. Child development: An historical perspective. CHILD DEVELOPMENT 27: 181-196.

Anderson, L. D. 1940. A longitudinal study of the effects of nursery-school training on successive intelligence test ratings. *Yearbook of the National Society for the Study of Education,* vol. 39, part 2, pp. 3-10.

Anderson, R. C. 1965. Can first graders learn an advanced problem-solving skill? JOURNAL OF EDUCATIONAL PSYCHOLOGY 56:283-294.

Anderson, S. B. 1968. *The making of a pupil: Changing children into school children.* ED 037 235.

Andreas, V. J. 1972. School entrance ages and subsequent progress. Unpublished master's thesis, University of Northern Colorado, Greeley, Colorado.

Andrus, R., and Horowitz, E. L. 1938. The effect of nursery school training: Insecurity feelings. CHILD DEVELOPMENT 9:169-174.

Angell, D. B. 1954. Differences in social behavior between elementary school children who have attended nursery school and those who have not attended nursery school. Unpublished master's thesis, North Texas State College, Denton, Texas.

Appel, M. H. 1942. Aggressive behavior of nursery school children and adult procedures in dealing with such behavior. JOURNAL OF EXPERIMENTAL EDUCATION 11:185-199.

Arena, T. 1970. Social maturity in the prediction of academic achievement. JOURNAL OF EDUCATIONAL RESEARCH 64:21-22.

Asbury, C. A. 1970. Some effects of training on verbal mental functioning in Negro preschool children: A research note. JOURNAL OF NEGRO EDUCATION 39:100-103.

Asher, S. R., and Markell, R. A. 1973. Influence of interest on sex differences in reading comprehension. Paper presented at the annual meeting of the American Educational Research Association.

Austin, Gilbert R. 1972. International comparative study of school-related achievement as it reflects effects of early childhood education. Working document. Paris: Centre for Educational Research and Innovation.

Ausubel, D. P. 1962. Can children learn anything that adults can and more effectively? ELEMENTARY SCHOOL JOURNAL 62:270-272.

Ausubel, D. P., and Ausubel, P. 1963. Ego development among segregated Negro children. In *Education in depressed areas,* ed. H. H. Passow. New York: Columbia University Teachers College Press.

Ayres, J. A. 1968. Reading--a product of sensory integrative processes. In *Perception and reading,* ed. H. K. Smith, pp. 77-82. Newark, Delaware: International Reading Association.

Baer, C. J. 1958. The school progress and adjustment of underage and overage students. JOURNAL OF EDUCATIONAL PSYCHOLOGY 49:17-19.

Baldwin, A. L.; Kalhorn, J.; and Breese, F. H. 1945. Patterns of parent behavior. PSYCHOLOGICAL MONOGRAPHS, vol. 58, no. 3 (serial no. 268).

Ball, R. S. 1970. The relation of certain home environment factors to the thinking abilities of three-year-old children. ED 039 041.

Balow, I. H. 1963. Sex differences in first grade reading. ELEMENTARY ENGLISH 40:303-306, 320.

Balow, I. H., and Balow, B. 1964. Lateral dominance and reading achievement in the second grade. AMERICAN EDUCATIONAL RESEARCH JOURNAL 1:139-143.

Baratz, S. S., and Baratz, J. C. 1970. Early childhood intervention: The social science base of institutional racism. HARVARD EDUCATIONAL REVIEW 40:29-50.

Barbrack, C. R., and Horton, D. M. 1970. Educational intervention in the home and paraprofessional career development: A second generation mother study with an emphasis on costs and benefits. DARCEE papers and reports, vol. 4, no. 4. Nashville, Tennessee: George Peabody College for Teachers.

Barry, H.; Bacon, M. K.; and Child, E. L. 1957. A cross-cultural survey of some sex differences in socialization. JOURNAL OF ABNORMAL SOCIAL PSYCHOLOGY 55:327-332.

Bauch, J. P. 1971. Cities: An alien environment for young children. PEABODY JOURNAL OF EDUCATION 48:122-124.

Baumrind, D. 1967. Child care practices anteceding three patterns of preschool behavior. GENETIC PSYCHOLOGY MONOGRAPHS 75:43-88.

Baumrind, D., and Black, A. E. 1967. Socialization practices associated with dimensions of competence in preschool boys and girls. CHILD DEVELOPMENT 38:291-327.

Bayley, N. 1956. Individual patterns of development. CHILD DEVELOPMENT 27:45-74.

________. 1966. The two year old. Paper read at Duke University, Education Improvement Program, Durham, North Carolina, May 5, 1966.

________. 1970. Development of mental abilities. In Carmichael's manual of child psychology, ed. J. Mussen, 1:1163-1209. New York: Wiley & Sons.

Bayley, N., and Schaefer, E. S. 1964. Correlations of maternal and child behaviors with the development of mental abilities. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT, vol. 29, no. 6 (serial no. 97).

Beasley, D. S., and Beasley, D. C. 1973. Auditory reassembly abilities of black and white first- and third-grade children. JOURNAL OF SPEECH AND HEARING RESEARCH 16: 213-221.

Beery, J. W. 1967. Matching of auditory and visual stimuli by average and retarded readers. CHILD DEVELOPMENT 38:827-833.

Beilin, H., and Franklin, I. C. 1962. Logical operations in area and length measurement: Age and training effects. CHILD DEVELOPMENT 33:607-618.

Bell, R., and Costello, N. 1964. Three tests for sex differences in tactile sensitivity in the newborn. BIOLOGIA NEONATORUM 7:335-347.

Bell, R., and Darling, J. F. 1965. The prone head reaction in the human neonate: Relation with sex and tactile sensitivity. CHILD DEVELOPMENT 36:943-949.

Bell, S. M. 1970. The development of the concept of object as related to infant-mother attachment. CHILD DEVELOPMENT 41:291-311.

Bell, S. M. 1971. Early cognitive development and its relationship to infant-mother attachment: A study of disadvantaged Negro infants. Final report, Project No. 508, Johns Hopkins University. Washington, D.C.: OE, U.S. Department of Health, Education and Welfare.

Bell, T. H. 1973. Your child's intellect. Salt Lake City, Utah: Olympus Publishing Company.

Beller, E. K. 1962. A study of dependency and aggression in early childhood. Progress report, project M-849, Child Development Center, New York, New York.

________. 1967. A study of cognitive and social functioning. Project II: A study of the attitudes of parents of deprived children. Project III. ED 025 310.

________. 1974. Impact of early education on disadvantaged children. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 15-48. Washington, D.C.: Department of Health, Education and Welfare.

Beller, E. K., and Neubauer, P. B. 1963. Sex differences and symptom patterns in early childhood. JOURNAL OF CHILD PSYCHIATRY 2:414-433.

Bennett, E. L., et al. 1964. Chemical and anatomical plasticity of brain. SCIENCE 146:610-619.

Bennett, E. L., Rosenzweig, M. R., and Diamond, M. C. 1970. Time courses of effects of differential experiences on brain measures and behavior of rats. In Molecular approaches to learning and memory, ed. W. L. Byrne. New York: Academic Press.

Bentzen, F. 1963. Sex ratios in learning and behavior. AMERICAN JOURNAL OF ORTHOPSYCHIATRY 33:92-98.

Bercovici, A., and Feshbach, N. 1973. Teaching styles of mothers of "successful" readers and "problem" readers in the first grade. ED 076 962.

Bereiter, C. 1967. Acceleration of intellectual development in early childhood. ED 014 332.

________. 1972. Schools without education. HARVARD EDUCATIONAL REVIEW 42:390-413.

Bereiter, C., and Engelmann, S. 1966a. Effectiveness of direct verbal instruction on IQ performance and achievement in reading and arithmetic. ED 030 496.

________. 1966b. Observations on the use of direct instruction with young disadvantaged children. JOURNAL OF SCHOOL PSYCHOLOGY 4:55-62.

________. 1966c. Teaching the disadvantaged child in the preschool. Englewood Cliffs, N. J.: Prentice-Hall.

Berger, H. 1932. Ueber das elektrenkephalogramm des menschen. IV Mitteilung. ARCH. F. PSYCHIAT. 97:6-26.

Berk, L. E.; Rose, M. H.; and Stewart, D. 1970. Attitudes of English and American children toward their school experience. JOURNAL OF EDUCATIONAL PSYCHOLOGY 61:33-40.

Bigelow, G. S. 1971. Field dependence--field independence in 5- to 10-year-old children. JOURNAL OF EDUCATIONAL RESEARCH 64:397-400.

Bing, E. 1963. Effect of childrearing practices on development of differential cognitive abilities. CHILD DEVELOPMENT 34:631-648.

Birch, H. G., and Belmont, L. 1965. Lateral dominance, lateral awareness, and reading disability. CHILD DEVELOPMENT 36:57-71.

Birch, H. G., and Bortner, M. 1966. Stimulus competition and category usage in normal children. JOURNAL OF GENETIC PSYCHOLOGY 109:195-204.

Birch, H. G., and Lefford, A. 1963. Intersensory development in children. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT vol. 28, no. 5 (serial no. 89).

Bird, G. E. 1940. Effect of nursery school attendance upon mental growth of children. Yearbook of the National Society for the Study of Education, vol. 39, part 2, pp. 81-84.

Bissell, J. S. 1970. The cognitive effects of preschool programs for disadvantaged children. Unpublished doctoral thesis, Harvard University.

Blank, M. H., and Solomon, F. 1969. How shall the disadvantaged child be taught? CHILD DEVELOPMENT 40:47-61.

Blatt, B., and Garfunkel, F. 1965. A field demonstration of the effects of nonautomated responsive environments on the intellectual and social competence of educable mentally retarded children. ED 010 289.

________. 1969. The educability of intelligence. Washington, D.C.: Council for Exceptional Children.

Bledsoe, J. C. 1967. Self-concepts of children and their intelligence achievement, interests and anxiety. CHILDHOOD EDUCATION 43:436-438.

Blehar, M. 1974. Anxious attachment and defensive reactions associated with day care. CHILD DEVELOPMENT 45:683-692.

Bloom, B. S. 1964. Stability and change in human characteristics. New York: Wiley.

________. 1965. Early learning in the home. ED 019 127.

Blum, D. M., and Chagnon, J. G. 1967. The effect of age, sex and language on rotation in a visual-motor task. JOURNAL OF SOCIAL PSYCHOLOGY 71:125-132.

Bonney, M. E., and Nicholson, E. L. 1958. Comparative social adjustments of elementary school pupils with and without preschool training. CHILD DEVELOPMENT 29:125-133.

Bookbinder, G. E. 1967. The preponderance of summer-born children in E.S.N. classes: Which is responsible: Age or length of infant schooling? EDUCATIONAL RESEARCH 9:213-218.

BOSTON RECORDER AND SCRIPTURAL TRANSCRIPT [newspaper], July 9, 1829.

Bottrill, J. H. 1967. Effects of preschool experience on the school readiness level of privileged and underprivileged children. EXCEPTIONAL CHILDREN 34:275.

Bouchard, R. A., and Mackler, B. 1967. A prekindergarten program for four-year-olds with a review of the literature on preschool education. ED 026 124.

Bowlby, J. 1953. Some pathological processes set in train by early mother-child separation. JOURNAL OF MENTAL SCIENCE 99:265-272.

________. 1965. Child care and the growth of love. Baltimore: Penguin.

________. 1967. Maternal care and mental health. New York: Schocken Books.

________. 1969. *Attachment and loss,* vol. 1. New York: Basic Books.

________. 1973. *Attachment and loss, II. Separation, anxiety and anger.* New York: Basic Books.

Brackbill, Y. 1973. Continuous stimulation reduces arousal level: Stability of the effect over time. CHILD DEVELOPMENT 44:43-46.

Braga, J. L. 1969. Analysis and evaluation of early admission to school for mentally advanced children. JOURNAL OF EDUCATIONAL RESEARCH 63:103-106.

________. 1971. Early admission: Opinion versus evidence. ELEMENTARY SCHOOL JOURNAL 72:35-46.

Brandis, W., and Bernstein, B. 1974. *Selection and control. Teachers' ratings of children in the infant school.* London: Routledge and Kegan Paul. pp. 136, 139-157.

Brazelton, T. B. 1974. *Toddlers and parents. A declaration of independence.* Delacorte Press, Seymour Lawrence. A Merloyd Lawrence Book.

Brekke, V. W.; Williams, J. D.; and Harlow, S. D. 1973. Conservation and reading readiness. JOURNAL OF GENETIC PSYCHOLOGY 123:133-138.

Brenner, A., and Stott, L. H. 1973. *School readiness factor analyzed.* Detroit: Merrill-Palmer Institute.

Briggs, P. F., and Tellegen, A. 1970. Further normative data on a Frostig subtest, eye-hand coordination. PERCEPTUAL AND MOTOR SKILLS 30:640-642.

Brison, D. W. 1966. Acceleration of conservation of substance. JOURNAL OF GENETIC PSYCHOLOGY 109:311-322.

Bronfenbrenner, U. 1973. The social ecology of human development. In *Brain and intelligence: The ecology of child development,* pp. 113-129. Hyattsville, Maryland: National Educational Press.

________. 1974. The origins of alienation. SCIENTIFIC AMERICAN 231:53-61.

Brook, J. S. 1970. A test of Piaget's theory of "nominal realism." JOURNAL OF GENETIC PSYCHOLOGY 116:165-175.

Brookover, W. B. 1969. Self-concept and achievement. A paper presented at the annual meeting of the American Educational Research Association, Los Angeles, February, 1969.

Brookover, W. B.; Patterson, A.; and Thomas, S. 1962. Self-concept of ability and school achievement. USOE Project No. 845. East Lansing: Michigan State University.

________. 1964. Self-concept of ability and school achievement. SOCIOLOGY OF EDUCATION 37:271-278.

Brophy, J. E. 1970. Mothers as teachers of their own preschool children: The influence of socioeconomic status and task structure on teaching specificity. CHILD DEVELOPMENT 41:79-94.

Brown, A. L. 1973. Conservation of numbers and continuous quantity in normal, bright, and retarded children. CHILD DEVELOPMENT 44:376-379.

Brown, A. W., and Hunt, R. 1961. Relations between nursery school attendance and teachers' ratings of some aspects of children's adjustment in kindergarten. CHILD DEVELOPMENT 32:585-596.

Bryant, P. E., and Trabasso, T. 1971. Transitive inferences and memory in young children. NATURE 232:456-458.

Bryden, M. P. 1972. Auditory-visual and sequential-spatial matching in relation to reading ability. CHILD DEVELOPMENT 43:824-832.

Budoff, M., and Quinlan, D. 1964. Auditory and visual learning in primary grade children. CHILD DEVELOPMENT 35:583-586.

Buktenica, N. A. 1968. Visual learning. Dimensions in early learning series. ED 027 089.

Busse, T. V., et al. 1972. Environmentally enriched classrooms and the cognitive and perceptual development of Negro preschool children. JOURNAL OF EDUCATIONAL PSYCHOLOGY 63:15-21.

Butler, A. L. 1971. Recent research in early childhood education. ED 058 970.

Cairns, R. B. 1972. Attachment and dependency: A psychobiological and social-learning synthesis. In Attachment and dependency, ed. J. L. Gewirtz, pp. 29-80. Washington, D.C.: V. H. Winston & Sons.

Caldwell, B. M. 1972. What does research teach us about day care: For children under three. CHILDREN TODAY 1:6-11.

Caldwell, B. M., and Ricciuti, H. N., eds. 1973. Review of child development research, vol. 3. Chicago: University of Chicago Press.

California State Department of Education. 1972. Early childhood education: Report of the task force on early childhood education. Sacramento.

Caplin, M. D. 1966. The relationship between self-concept and academic achievement and between level of aspiration and academic achievement. Doctoral dissertation, Columbia University, New York, New York.

Carlsmith, L. 1964. Effect of early father absence on scholastic aptitude. HARVARD EDUCATIONAL REVIEW 34:3-21.

Carpenter, E., and Shipley, E. 1962. Freedom to move. ED 020 778.

Carroll, M. L. 1963. Academic achievement and adjustment of underage and overage third graders. JOURNAL OF EDUCATIONAL RESEARCH 56:415-419.

Carter, L. B. 1956. The effect of early school entrance on the scholastic achievement of elementary school children in the Austin public schools. JOURNAL OF EDUCATIONAL RESEARCH 50:91-103.

Cartwright, W. J., and Steglich, W. G. 1965. Report of the effectiveness of project Head Start, Lubbock, Texas. ED 019 131.

Cawley, J. F.; Burrow, W. H.; and Goodstein, H. A. 1970. Performance of Head Start and non-Head Start participants at first grade. JOURNAL OF NEGRO EDUCATION 39:124-131.

Chalfant, J. C., and Scheffelin, M. A. 1969. Central processing dysfunctions in children: A review of research. Washington, D.C.: DHEW.

Chansky, N. M. 1963. Age, IQ, and improvement of reading. JOURNAL OF EDUCATIONAL RESEARCH 56:439.

Chissom, B. S. 1971. A factor-analytic study of the relationship of motor factors to academic criteria for first- and third-grade boys. CHILD DEVELOPMENT 42:1133-1143.

Chomsky, C. 1972. Language development after age six. In Readings in child behavior and development, eds. C. S. Lavatelli and F. Stendler, pp. 271-282. New York: Harcourt Brace Jovanovich.

Choppin, B. H. 1969. The relationship between achievement and age. EDUCATIONAL RESEARCH 12:22-29.

Clarizio, H. F. 1968. Maternal attitude change associated with involvement in project Head Start. JOURNAL OF NEGRO EDUCATION 37:106-113.

Clarke, A. D. B. 1968. Learning and human development. BRITISH JOURNAL OF PSYCHIATRY 114: 1061-1077.

Clarke, H. H., and Drowatzky, J. N. 1972. Mental, social, and physical characteristics of boys underaged and modal-aged in elementary school. ELEMENTARY SCHOOL JOURNAL 73:26-35.

Clasen, R. E.; Spear, J. E.; and Tomaro, M. P. 1969. A comparison of the relative effectiveness of two types of preschool compensatory programming. JOURNAL OF EDUCATIONAL RESEARCH 62:401-405.

Cline, M., and Dickey, M. 1968. An evaluation and follow-up study of summer 1966 Head Start children in Washington, D.C. ED 020 794.

Coffman, A. O., and Dunlap, J. 1967. Effects of assessment and personalized programming for subsequent intellectual development of prekindergarten and kindergarten children. ED 013 663.

Cole, M., and Bruner, J. S. 1972. Preliminaries to a theory of cultural differences. In Early childhood education, ed. I. J. Gordon, pp. 161-179. Chicago: University of Chicago Press.

Coleman, H. M. 1968. Visual perception and reading dysfunction. JOURNAL OF LEARNING DISABILITIES 1:26-33.

Collard, R. R. 1971. Exploratory and play behaviors of infants reared in an institution and in lower- and middle-class homes. CHILD DEVELOPMENT 42:1003-1015.

Colton, F. V. 1972. Cognitive and affective reactions of kindergartners to video displays. CHILD STUDY JOURNAL 2:63-66.

Conners, C. K.; Schuette, C.; and Goldman, A. 1967. Informational analysis of intersensory communication in children of different social class. CHILD DEVELOPMENT 38:251-266.

Coopersmith, S. 1967. The antecedents of self-esteem. San Francisco: W. H. Freeman & Co.

Cox, F. N., and Campbell, D. 1968. Young children in a new situation with and without their mothers. CHILD DEVELOPMENT 39:123-131.

Crandall, V., and Rabson, A. 1960. Children's repetition choices in an intellectual achievement situation following success and failure. JOURNAL OF GENETIC PSYCHOLOGY 97:161-168.

Crandall, V., et al. 1964. Parents' attitudes and behaviors and grade school children's academic achievements. JOURNAL OF GENETIC PSYCHOLOGY 104:53-66.

Cravioto, J.; DeLicardie, E. R.; and Birch, H. G. 1966. Nutrition, growth, and neurointegrative development: An experimental and ecologic study. PEDIATRICS 38:319-372.

Crosby, R. M. N., and Liston, R. A. 1968. The Waysiders. New York: Delacorte.

Crovetto, A. M.; Fischer, L. L.; and Boudreaux, J. L. 1967. The preschool child and his self-image. Division of Instruction and Division of Pupil Personnel, New Orleans Public Schools, 1967.

Cutts, N., and Moseley, N. 1957. Teaching the disorderly pupil in elementary and secondary school. New York: Longmans.

D'Andrade, R. G. 1966. Sex differences and cultural institutions. In The development of sex differences, ed. E. E. Maccoby, pp. 56-81. Stanford, California: Stanford University Press.

Davidson, H. H., and Lang, G. 1960. Children's perceptions of their teachers' feelings toward them related to self-perception, school achievement, and behavior. JOURNAL OF EXPERIMENTAL EDUCATION 29:107-118.

Davie, R.; Butler, N.; and Goldstein, H. 1972. From birth to seven. New York: Longmans, Green.

Deal, Therry N. 1966. Effects of a structured program of preschool mathematics on cognitive behavior. ED 015 791.

deHirsch, K.; Jansky, J. J.; and Langford, W. S. 1966. Predicting reading failure. New York: Harper & Row.

Denenberg, V. H. 1969. Animal studies of early experience. Some principles which have implications for human development. In Minnesota symposia on child psychology, ed. J. P. Hill, 3:31-45. Minneapolis: University of Minnesota Press.

Dennis, W. 1942. The performance of Hopi children on the Goodenough Draw-A-Man test. JOURNAL OF COMPARATIVE PSYCHOLOGY 34:341-348.

Deutsch, M., et al. 1971. Regional research and resource center in early childhood. ED 055 649.

Deutsch, M.; Taleporos, E.; and Victor, J. 1974. A brief synopsis of an initial enrichment program in early childhood. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 49-60. Washington, D.C.: Office of Child Development.

Devereau, E. C. 1970. The role of peer-group experience in moral development. In Minnesota symposia on child psychology, ed. J. P. Hill, 4:94-140. Minneapolis: University of Minnesota Press.

DeWitt, B. F. 1961. An analysis of the effect of chronological age as a factor in achievement in the elementary school. Doctoral dissertation, State University of Iowa, Iowa City, Iowa.

Dickinson, D. J., and Larson, J. D. 1963. The effects of chronological age in months on school achievement. JOURNAL OF EDUCATIONAL RESEARCH 56:492-493.

DiLorenzo, L. T. 1971. Which way for Pre-K: Wishes or reality? AMERICAN EDUCATION 7:28-32.

DiLorenzo, L. T., and Salter, R. 1968. An evaluative study of prekindergarten programs for educationally disadvantaged children: Follow-up and replication. EXCEPTIONAL CHILDREN 35:111-119.

Donaldson, R. S., and Kohl, S. G. 1965. Perinatal mortality in twins by sex. AMERICAN JOURNAL OF PUBLIC HEALTH 55:1411-1418.

Douglas, J. W. B., and Ross, J. M. 1964. The later educational progress and emotional adjustment of children who went to nursery schools or classes. EDUCATIONAL RESEARCH 7:73-80.

Downing, J. 1970. Children's concepts of language in learning to read. EDUCATIONAL RESEARCH 12:106-112.

Drews, E. M., and Teahen, J. E. 1957. Parental attitudes and academic achievement. JOURNAL OF CLINICAL PSYCHOLOGY 13:328-332.

Dublin, L. I. 1965. *Factbook on Man.* New York: Macmillan.

Dunlap, J. M., and Coffman, A. L. 1970. *The effects of assessment and personalized programming on subsequent intellectual development of prekindergarten and kindergarten children.* ED 045 198.

Durkin, D. 1961. Children who learned to read at home. ELEMENTARY SCHOOL JOURNAL 62:14-18.

________. 1962. An earlier start in reading. ELEMENTARY SCHOOL JOURNAL 63:146-151.

________. 1963. Children who read before grade 1: A second study. ELEMENTARY SCHOOL JOURNAL 64:143-148.

________. 1970. What does research say about the time to begin reading instruction? JOURNAL OF EDUCATIONAL RESEARCH 64:52-56.

Dyer, D. W., and Harcum, E. R. 1961. Visual perception of binary pattern by preschool children and by school children. JOURNAL OF EDUCATIONAL PSYCHOLOGY 52:161-165.

Eccles, J. C. 1968. Chairman's opening remarks. In *Growth of the nervous system*, ed. G. E. W. Wolstenholme and M. O'Connor. Boston: Little, Brown and Co.

________. 1970. *Facing reality*. New York: Springer-Verlag.

________. 1974. Neurosciences: Our brains and our future. In *The greatest adventure*, ed. E. H. Kone and H. J. Jordan. New York: The Rockefeller University Press.

Edwards, J. B. 1974. A developmental study of the acquisition of some moral concepts in children aged 7 to 15. EDUCATIONAL RESEARCH 16:83-93.

Ekholm, J. 1967. Postnatal changes in cutaneous reflexes and in the discharge pattern of cutaneous and articular sense organs. ACTA PHYSIOLOGICA SCANDINAVICA. Supplement 297.

Eklund, S. J. 1970. Competitiveness in boys as related to academic achievement and mothers' achievement orientation. DARCEE papers and reports, vol. 1, no. 7. Nashville, Tennessee: George Peabody College for Teachers.

Elkind, D. 1961a. The development of quantitative thinking: A systematic replication of Piaget's studies. JOURNAL OF GENETIC PSYCHOLOGY 98:37-46.

________. 1961b. Children's discovery of the conservation of mass, weight, and volume: Piaget replication study II. JOURNAL OF GENETIC PSYCHOLOGY 98:219-227.

________. 1961c. The development of the additive composition of classes in the child: Piaget replication study III. JOURNAL OF GENETIC PSYCHOLOGY 99:51-57.

________. 1961d. Children's conceptions of right and left: Piaget replication study IV. JOURNAL OF GENETIC PSYCHOLOGY 99:269-276.

________. 1969. Piagetian and psychometric conceptions of intelligence. HARVARD EDUCATIONAL REVIEW 39:319-337.

________. 1970. The case for the academic preschool: Fact or fiction? YOUNG CHILDREN 25:132-140.

Ellingson, R. J. 1972. Development of wakefulness-sleep cycles and associated EEG patterns in mammals. In *Sleep and the maturing nervous system*, ed. C. D. Clemente, D. P. Purpura and F. E. Mayer. New York: Academic Press.

Ellingson, R. J., and Wilcott, R. C. 1960. Development of evoked responses in visual and auditory cortices of kittens. JOURNAL OF NEUROPHYSIOLOGY 23:363-375.

Emde, R. N., and Metcalf, D. R. 1970. An electroencephalographic study of behavioral rapid eye movement states in the newborn. JOURNAL OF NERVOUS AND MENTAL DISEASE 150:370-376.

Engelmann, S. 1967. *Teaching formal operations to preschool advantaged and disadvantaged children*. ED 019 990.

Erikson, E. 1950. *Childhood and society*. New York: Norton.

Escalona, S. 1974. The present state of knowledge and available techniques in the area of cognition. In *Methodological approaches to the study of brain maturation and its abnormalities*.

Fanaroff, A.; Kennell, J. H.; and Klaus, M. H. 1972. Follow-up of low birth weight infants--the predictive value of maternal visiting patterns. PEDIATRICS 49:287-290.

Farber, A. E. 1970. A comparison of the effect of verbal and material reward on the learning of lower class preschool children. DARCEE papers and reports, vol. 4, no. 8. Nashville, Tennessee: George Peabody College for Teachers.

Farber, B. 1962. Marital integration as a factor in parent-child relations. CHILD DEVELOPMENT 33:1-14.

Featherstone, H. J. 1973. Cognitive effects of preschool programs on different types of children. ED 082 838.

Feigenbaum, K. D.; Geiger, D.; and Crevoshay, S. 1970. An exploratory study of the 3-, 5-, and 7-year-old female's comprehension of cooperative and uncooperative social interaction. JOURNAL OF GENETIC PSYCHOLOGY 116:141-148.

Feshbach, N. 1969. Sex differences in children's modes of aggressive responses toward outsiders. MERRILL-PALMER QUARTERLY 15:249-258.

Feyberg, P. S. 1966. Concept development in Piagetian terms in relation to school attainment. JOURNAL OF EDUCATIONAL PSYCHOLOGY 57:164-168.

Flammer, D. P. 1971. Self-esteem, parent identification and sex role development in preschool age boys and girls. CHILD STUDY JOURNAL 2:39-45.

Flory, C. D. 1936. Osseous development in the hand as an index of skeletal development. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT, vol. 1, no. 3.

Flower, R. M. 1968. The evaluation of auditory abilities in the appraisal of children with reading problems. In Perception and reading, ed. H. K. Smith, pp. 21-24. Newark, Delaware: International Reading Association.

Forbes, G. B., and Dykstra, D. 1971. Children's attribution of negative traits to authority figures as a function of family size and sex. PSYCHOLOGICAL REPORTS 28:363-366.

Forester, J. J. 1955. At what age should a child start school? SCHOOL EXECUTIVE 74:80-81.

Forgione, P. D. 1975. Study of the rationales for early childhood education policy making: A case study analysis of five selected states. A paper presented to the American Educational Research Association, Washington, D. C. April, 1975.

Formaneck, R., and Woog, P. 1971. Attitudes of preschool and elementary school children to authority figures. CHILD STUDY JOURNAL 1:100-110.

Fortenberry, W. D. 1969. An investigation of the effectiveness of a special program upon the development of visual perception for word recognition of culturally disadvantaged first grade students. ED 036 411.

Fowler, W. 1962. Cognitive learning in infancy and early childhood. PSYCHOLOGICAL BULLETIN 59:116-152.

Frank, L. 1962. The beginnings of child development and family life education in the 20th century. MERRILL-PALMER QUARTERLY 8:207-227.

Frerichs, A. H. 1971. Relationship of self-esteem of the disadvantaged to school success. JOURNAL OF NEGRO EDUCATION 40:117-120.

Freyman, R. 1965. Further evidence on the effect of date of birth on subsequent school performance. EDUCATIONAL RESEARCH 8:58-64.

Friedman, R. 1974. Characteristics of early education needs of disadvantaged children. CHILD WELFARE 53:93-97.

Froebel, F. 1896. *The education of man.* New York: D. Appleton and Company.

Frost, J. L. 1967. *A study of the effects of an elementary school enrichment program on the school achievement of welfare recipient children*. ED 016 734.

Frostig, M. 1968. Visual modality, research and practice. In *Perception and reading*, ed. H. K. Smith, pp. 25-33. Newark, Delaware: International Reading Association.

Frostig, M.; Lefever, W.; and Whittlesey, J. 1963. Disturbances in visual perception. JOURNAL OF EDUCATIONAL RESEARCH 57:160-162.

Furth, H. G. 1963. Conceptual discovery and control on a pictorial part-whole task as a function of age, intelligence, and language. JOURNAL OF EDUCATIONAL PSYCHOLOGY 54:191-196.

_______. 1966. *Thinking without language.* New York: Free Press.

Galambos, R. 1967. Brain correlates of learning. In *The neurosciences*, ed. G. C. Quarton, T. Melnechuk and F. O. Schmitt. New York: The Rockefeller University Press.

Garai, J. E., and Scheinfeld, A. 1968. Sex differences in mental and behavioral traits. GENETIC PSYCHOLOGY MONOGRAPHS 77:169-299.

Gardner, R. W., and Moriarty, A. 1968. *Personality development at preadolescence*. Seattle: University of Washington Press.

Gaskill, A. R., and Fox, W. C. 1964. How useful are psychological tests for screening underage school beginners? JOURNAL OF EDUGATIONAL RESEARCH 57:333-336.

Geber, M. 1958. The psycho-motor development of African children in the first year, and the influence of maternal behavior. JOURNAL OF SOCIAL PSYCHOLOGY 47:185-195.

Gelles, H. M., and Coulson, M. C. 1959. At what age is a child ready for school? SCHOOL EXECUTIVE 78:29-31.

Gershaw, N. J., and Schwarz, J. C. 1971. The effects of a familiar toy and mother's presence on exploratory and attachment behaviors in young children. CHILD DEVELOPMENT 42:1662-1666.

Geschwind, N. 1964. The development of the brain and the evolution of language. MONOGRAPH SERIES ON LANGUAGE AND LINGUISTICS, no. 17.

Gewirtz, H. B., and Gewirtz, J. L. 1969. Caretaking settings, background events, and behavior differences in four Israeli child-rearing environments: Some preliminary trends. In Determinants of infant behavior IV, ed. B. M. Foss, pp. 229-252. London: Methuen.

Gewirtz, J. L. 1965. The course of infant smiling in four child-rearing environments in Israel. In Determinants of infant behavior III, ed. B. M. Foss, pp. 205-260. London: Methuen; New York: Wiley.

________. 1972a. Attachment and dependency. Washington, D.C.: V. H. Winston & Sons.

________. 1972b. Attachment, dependence, and a distinction in terms of stimulus control. In Attachment and dependency, ed. J. L. Gewirtz, pp. 139-177. Washington, D.C.: V. H. Winston & Sons.

________. 1972c. On the selection and use of attachment and dependence indices. In Attachment and dependency, ed. J. L. Gewirtz, pp. 179-215. Washington, D.C.: V. H. Winston & Sons; New York: Wiley.

Gewirtz, J. L., and Gewirtz, H. B. 1965. Stimulus conditions, infant behaviors, and socia learning in four Israeli child-rearing environments: A preliminary report illustrating differences in environment and behavior between the "only" and the "youngest" child. In Determinants of infant behavior III, ed. B. M. Foss, pp. 161-184. London: Methuen; New York: Wiley.

Gibbs, F. A., and Gibbs, E. L. 1951. Atlas of electroencephalography. Reading, Massachusetts: Addison-Wesley Publishing Co.

Gill, M. P. 1969. Pattern of achievement as related to the perceived self. Paper read at the annual meeting of the American Educational Research Association, Los Angeles, February, 1969.

Gill, N.; Herdtner, T. J.; and Lough, L. 1968. Selected perceptual and socio-economic variables, body-orientation instruction, and predicted academic success in young children. CHILDHOOD EDUCATION 45:52-54.

Girona, R. 1972. Changes operated in institutionalized children as a result of controlled interaction with a "significant adult." JOURNAL OF EDUCATIONAL RESEARCH 65:343-346.

Glueck, S., and Glueck, E. 1950. Unraveling juvenile delinquency. Cambridge, Massachusetts: Harvard University Press.

________. 1968. Delinquents and nondelinquents in perspective. Cambridge, Massachusetts: Harvard University Press.

________. 1974. Of delinquency and crime: A panorama of years of search and research. Springfield, Illinois: Charles C. Thomas.

Golden, M., et al. 1969. Social class differentiation in cognitive development: A longitudinal study. ED 033 754.

Goodenough, F. L., and Maurer, K. A. 1940. The mental development of nursery school children compared with that of non-nursery school children. Yearbook of the National Society for the Study of Education, vol. 39, part 2, pp. 161-178.

Goodnow, J. J. 1962. A test of milieu differences with some of Piaget's tasks. PSYCHOLOGICAL MONOGRAPHS, vol. 76, no. 36 (serial no. 555).

_______. 1968 [date of study]. Cultural variations in cognitive skills. In Cross-cultural studies, ed. D. R. Price-Williams, pp. 246-264. Baltimore: Penguin, 1969.

Goodnow, J. J., and Bethon, G. 1966. Piaget's tasks: Effects of schooling and intelligenc CHILD DEVELOPMENT 37:573-582.

Gordon, I. J. 1969. Relationship between observed home behavior variables and infant performance at age one. Gainesville, Florida: Institute for Development of Human Resources, University of Florida.

_______. 1971. Early stimulation through parent education. In Readings in research in developmental psychology, ed. I. J. Gordon, pp. 146-154. Glenview, Ill.: Scott, Foresman & Co.

_______. 1972a. Success and accountability. CHILDHOOD EDUCATION 48:338-347.

_______. 1972b. What do we know about parents-as-teachers? ED 065 788.

_______. 1973. A home learning center approach to early stimulation. Gainesville, Florida: Institute for Development of Human Resources, University of Florida.

Gordon, I. J., and Guinagh, B. J. 1969. A home learning center approach to early stimulation. ED 056 750.

Gordon, I. J., et al. 1969. Reaching the child through parent education: The Florida approach. ED 057 880.

Gott, M. A. 1963. The effect of age difference at kindergarten entrance on achievement and adjustment in elementary school. Doctoral dissertation, University of Colorado, Boulder, Colorado.

Gray, S. W. 1971. The child's first teacher. CHILDHOOD EDUCATION 48:127-129.

Gray, S. W. 1974. Children from three to ten: The early training project. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 61-67. Washington, D. C.: Office of Child Development.

Gray, S. W., and Klaus, R. 1965. An experimental pre-school program for culturally deprived children. CHILD DEVELOPMENT 36:887-898.

_______. 1970. The early training project: A seventh year report. CHILD DEVELOPMENT 41:909-924.

Greathouse, B. 1972. The effects of toy talk training and experience on low income black mothers and their pre-school children. Doctoral dissertation, University of Arizona, Tucson, Arizona.

Green, D. R., and Simmons, S. V. 1962. Chronological age and school entrance. ELEMENTARY SCHOOL JOURNAL 63:41-47.

Greenfield, P. M. 1966 [date of study]. On culture and conservation. In Cross-cultural studies, ed. D. R. Price-Williams, pp. 211-245. Baltimore: Penguin, 1969.

Gross, M. 1967. Learning readiness in two Jewish groups: A study in "cultural deprivation." ED 026 126.

Grossman, B. D. 1969. Extracurricular parent-child contact and children's socially reinforced task behavior. JOURNAL OF GENETIC PSYCHOLOGY 114:291-299.

Grossman, M., and Philips, M. 1973. Ocular motility and reading skills. CHILD STUDY JOURNAL 3:39-45.

Guernsey, J. 1972. South Umpqua's kitchen classrooms. AMERICAN EDUCATION 8:24-27.

Guinagh, B. J. 1971. An experimental study of basic learning ability and intelligence in low socio-economic status children. CHILD DEVELOPMENT 42:27-36.

Hall, J. W. 1969. Errors in word recognition and discrimination by children of two age levels. JOURNAL OF EDUCATIONAL PSYCHOLOGY 60:144-147.

Hall, R. V. 1963. Does entrance age affect achievement? ELEMENTARY SCHOOL JOURNAL 63:391-396.

Halliwell, J. W., and Stein, B. W. 1964. Achievement of early and late school starters. ELEMENTARY ENGLISH 41:631-639.

Hamblin, J. A., and Hamblin, R. L. 1972. On teaching disadvantaged preschoolers to read: A successful experiment. AMERICAN EDUCATIONAL RESEARCH JOURNAL 9:209-216.

Hamburg, D. A. 1966. Effects of progesterone on behavior. In Endocrines and the nervous system, ed. R. Levine. Baltimore: Williams and Wilkins.

Hamburg, D. A., and Lunde, D. T. 1966. Sex hormones in the development of sex differences in human behavior. In The development of sex differences, ed. E. E. Maccoby, pp. 1-24. Stanford, California: Stanford University Press.

Hammill, D. D., and Larsen, S. C. 1974. The relationship of selected auditory perceptual skills and reading ability. JOURNAL OF LEARNING DISABILITIES 7:429-435.

Hampleman, R. S. 1959. A study of the comparative reading achievements of early and late school starters. ELEMENTARY ENGLISH 36:331-334.

Hampson, J. G. 1955. Hermaphroditic appearance, rearing, and eroticism in hyperadrenocorticism. BULLETIN JOHNS HOPKINS HOSPITAL 96:265-273.

Hampson, J. L., and Hampson, J. G. 1961. The ontogenesis of sexual behavior in man. In Sex and internal secretions, ed. W. C. Young, vol. 2. Baltimore: Williams and Wilkins.

Handler, E. 1972. Comparative effectiveness of four preschool programs: A sociological approach. CHILD WELFARE 51:550-561.

Harding, J. 1966. A comparative study of various project Head Start programs. ED 019 987.

Harlen, W. 1968. The development of scientific concepts in young children. EDUCATIONAL RESEARCH 11:4-13.

Harlow, H. F., and Zimmerman, R. R. 1959. Affectioned responses in the infant monkey. SCIENCE 130:421-432.

Hartup, W. W., ed. 1972. The young child: Reviews of research, vol. 2. Washington, D. C.: National Association for the Education of Young Children.

Hartup, W. W., and Smothergill, N. L., eds. 1967. The young child: Reviews of research. Washington, D.C.: National Association for the Education of Young Children.

Harvey, O. J., et al. 1966. Teachers' belief systems and preschool atmospheres. JOURNAL OF EDUCATIONAL PSYCHOLOGY 57:373-381.

Hattwick, L. W. 1946. The influence of nursery school attendance upon the behavior and personality of the preschool child. JOURNAL OF EXPERIMENTAL EDUCATION 5:180-190.

Havighurst, R. J.; Gunther, M.; and Pratt, I. 1946. Environment and the Draw-A-Man test: The performance of Indian children. JOURNAL OF ABNORMAL AND SOCIAL PSYCHOLOGY 41:50-63.

Hawk, T. L. 1967. Self-concepts of the socially disadvantaged. ELEMENTARY SCHOOL JOURNAL 67:196-206.

Heber, R., and Garber, H. 1970. An experiment in the prevention of cultural-familial mental retardation. Proceedings of the Second Congress of the International Association for the Scientific Study of Mental Deficiency, Warsaw, Poland, August 25 to September 2, 1970.

Heffernan, H. 1968. A vital curriculum for today's young child. In Early childhood education rediscovered, ed. J. L. Frost, pp. 491-497. New York: Holt, Rinehart and Winston.

Herzog, E.; Newcomb, C. H.; and Cisin, I. H. 1974. Double deprivation: The less they have, the less they learn. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 69-93. Washington, D. C.: Office of Child Development.

Hess, R. D. 1969. Maternal behavior and the development of reading readiness in urban Negro children. Unpublished paper, University of Chicago.

________. 1972. Social competence and the educational process. Paper prepared for the study group of the Developmental Sciences Trust in London, January, 1972.

Hess, R. D., and Shipman, V. C. 1968. Maternal attitudes toward the school and the role of pupil: Some social class comparisons. In Developing programs for the educationally disadvantaged, ed. A. H. Passow, pp. 109-129. New York: Columbia University Teachers College Press.

Hess, R. D., et al. 1971. Parent involvement in early education. In Day Care: Resources for decision, ed. E. H. Grotberg, pp. 265-312. Washington, D. C.: Office of Economic Opportunity.

Hilgartner, H. 1962. The frequency of myopia found in individuals under 21 years of age. Unpublished manuscript, Austin, Texas. [First reported by Mosdle Boland.]

________. 1974. Letter to R. S. Moore, November 18, 1974.

Hillerich, R. L. 1964. Eye-hand dominance and reading achievement. AMERICAN EDUCATIONAL RESEARCH JOURNAL 1:121-126.

Himwich, H. E. 1973. Early studies of the developing brain. In Biochemistry of the developing brain, ed. W. Himwich. New York: Marcel Dekker.

Himwich, W. A. 1962. Biochemical and neurophysiological development of the brain in the neonatal period. INTERNATIONAL REVIEW OF NEUROBIOLOGY 4:117-158.

Hirst, W. E. 1970. Prediction of reading success. ED 040 825.

Hobson, J. R. 1948. Mental age as a workable criterion for school admission. ELEMENTARY SCHOOL JOURNAL 48:312-321.

Hodges, W. L., and Spicker, H. H. 1967. The effects of preschool experiences on culturally deprived children. In The young child: Reviews of research, eds. W. W. Hartup and N. L. Smothergill, pp. 262-289. Washington, D.C.: National Association for the Education of Young Children.

Hodgins, A., and Karnes, M. B. 1966. The effects of a highly structured preschool program on the measured intelligence of culturally disadvantaged four-year-old children. ED 019 116.

Hoffman, E. 1971. Pre-kindergarten experiences and their relationships to reading achievement. ILLINOIS SCHOOL RESEARCH 8:6-12.

Hoffman, L. W., and Hoffman, M. L. eds. 1966. *Review of child development research*, vol. 2. New York: Russell Sage Foundation.

Hoffman, M. L. 1963. Child-rearing practices and moral development: Generalizations from empirical research. CHILD DEVELOPMENT 34:295-318.

Hoffman, M. L., and Hoffman, L. W., eds. 1964. *Review of child development research*, vol. 1. New York: Russell Sage Foundation.

Holden, M. H., and MacGinitie, W. H. 1972. Children's conceptions of word boundaries in speech and print. JOURNAL OF EDUCATIONAL PSYCHOLOGY 63:551-557.

Hollos, M., and Cowan, P. A. 1973. Social isolation and cognitive development: Logical operations and role-taking abilities in three Norwegian social settings. CHILD DEVELOPMENT 44:630-641.

Holmes, D.; and Holmes, M. B. 1966. *An evaluation of differences among different classes of Head Start participants*. ED 015 012.

Home Start demonstration program: An overview. 1973. ED 077 583.

Honig, A. S.; Caldwell, B. M.; and Tannenbaum, J. 1970. Patterns of information processing used by and with young children in a nursery school setting. CHILD DEVELOPMENT 41:1045-1065.

Honzik, M. P. 1957. Developmental studies of parent-child resemblance in intelligence. CHILD DEVELOPMENT 28:215-227.

________. 1967. Environmental correlates of mental growth: Prediction from the family setting at 21 months. CHILD DEVELOPMENT 38:337-364.

Hooper, F. H. 1969. The Appalachian child's intellectual capabilities: Deprivation or diversity. JOURNAL OF NEGRO EDUCATION 38:224-235.

Horowitz, E. L., and Smith, R. B. 1939. Social relations and personality patterning in preschool children. JOURNAL OF GENETIC PSYCHOLOGY 54:337-352.

Horowitz, F. D., and Resenfeld, H. M. 1966. *Comparative studies of a group of Head Start and a group of non-Head Start preschool children*. ED 015 013.

Huberty, C. J., and Swan, W. W. 1974. Preschool classroom experience and first-grade achievement. JOURNAL OF EDUCATIONAL RESEARCH 67:311-316.

Hulan, J. R. 1972. Head Start program and early school achievement. ELEMENTARY SCHOOL JOURNAL 73:91-94.

Humphrey, T. 1953. The relation of oxygen deprivation to fetal reflex arcs and the development of fetal behavior. JOURNAL OF PSYCHOLOGY 35:3-43.

Hunt, J. McV. 1961. *Intelligence and experience*. New York: The Ronald Press Company.

Hurley, J. R. 1959. Maternal attitudes and children's intelligence. JOURNAL OF CLINICAL PSYCHOLOGY 15:291-292.

Husén, T., ed. 1967. International study of achievement in mathematics: A comparison of twelve countries I, II. New York: John Wiley & Sons.

Husén, T. 1972. Letter to R. S. Moore, November 23, 1972.

Huttenlocher, P. R. 1966. Development of neuronal activity in neocortex of the kitten. NATURE 211:91-92.

Hydén, H. 1972. Changes in brain protein during learning. In Macromolecules and behavior, ed. G. B. Ansell and P. B. Bradley. Baltimore: University Park Press.

Hyvarinen, J. 1966. Analysis of spontaneous spike potential activity in developing rabbit diencephalon. ACTA PHYSIOLOGICA SCANDINAVICA. Supplement 68.

Ilg, F. L., and Ames, L. B. 1950. Developmental trends in reading behavior. JOURNAL OF GENETIC PSYCHOLOGY 76:291-311.

Ilika, J. 1969. Age of entrance into the first grade as related to rate of scholastic achievement. ED 028 843.

Impellizzeri, I. H. 1967. Auditory perceptual ability of normal children aged five through eight. JOURNAL OF GENETIC PSYCHOLOGY 111:289-294.

James, W. 1890. Principles of psychology, 2 vols. Magnolia, Massachusetts: Peter Smith.

Jeffery, W. E. 1969. Early stimulation and cognitive development. In Minnesota symposia on child psychology, ed. J. P. Hill, 3:46-65. Minneapolis: University of Minnesota Press.

Jenkins, G. G. 1956. Responsibility in children: The contribution of the home. CHILD STUDY 33:3-6.

Jensen, A. R. 1969. Understanding readiness: An occasional paper. ED 032 117.

Jensen, A. R., and Rohwer, W. D. 1965. Syntactical mediation of serial and paired-associate learning as a function of age. CHILD DEVELOPMENT 36:601-608.

Jensen, J., and Kohlberg, L. 1966. Report of a research and demonstration project for culturally disadvantaged children in the Ancona Montessori school. ED 015 014.

Jersild, A. T. 1968. Child psychology. Englewood Cliffs, N. J.: Prentice-Hall.

Jersild, A. T., and Fite, M. D. 1939. The influence of nursery school experience on children's social adjustments. New York: Columbia University Teachers College Press.

Jersild, A. T., and Holmes, F. B. 1935. Children's fears. New York: Columbia University Teachers College Press.

Jersild, A. T., and Markey, F. V. 1935. Conflicts between preschool children. New York: Columbia University Teachers College Press.

Jessen, B. L., and Kaess, D. W. 1973. Effects of training on intersensory communication by three- and five-year-olds. JOURNAL OF GENETIC PSYCHOLOGY 123:115-122.

Jester, R. E. 1969. Focus on parent education as a means of altering the child's environment. ED 033 758.

Joel, W. 1939. The influence of nursery school education upon behavior maturity. JOURNAL OF EXPERIMENTAL EDUCATION 8:164-165.

Joint Commission on Mental Health of Children. 1973. Mental health: From infancy through adolescence. New York: Harper & Row.

Jones, P. A. 1972. Home environment and the development of verbal ability. CHILD DEVELOPMENT 43:1081-1086.

Jordan, T. E. 1971. Longitudinal study of preschool development. EXCEPTIONAL CHILDREN 37:509-512.

Kagan, J., and Moss, H. A. 1962. Birth to maturity. New York: Wiley.

Kagan, J.; Moss, H. A.; and Sigel, I. E. 1963. The psychological signficance of styles of conceptualization. In Basic cognitive processes in children, eds. J. C. Wright and J. Kagan. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT, no. 28.

Kanter, R. M. 1972. The organization child: Experience management in a nursery school. SOCIOLOGY OF EDUCATION 45:186-212.

Kapfer, S. 1972. Report of first national Home Start conference, St. Louis, Missouri, April 3-7, 1972. Washington, D.C.: Office of Child Development.

Karnes, M.B 1968. A research program to determine the effects ~~of~~ various preschool intervention programs on the development of disadvantaged children and the strategic age for such intervention. ED 017 319.

Karnes, M. B.; Zehrbach, R. R.; and Teska, J. A. 1974. The Karne's preschool program: Rationale, curricula offerings and follow-up data. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 95-108. Washington, D.C.: Office of Child Development.

Katkovsky, W.; Preston, A.; and Crandall, V. J. 1964a. Parents' attitudes toward their personal achievements and toward the achievement behaviors of their children. JOURNAL OF GENETIC PSYCHOLOGY 104:67-82.

________. 1964b. Parents' achievement attitudes and their behavior with their children in achievement stiuations. JOURNAL OF GENETIC PSYCHOLOGY 104:105-121.

Katz, L. G. 1973. Humaneness in preschool. ILLINOIS TEACHER FOR CONTEMPORARY ROLES 16:179-182.

Kaufman, A. S., and Kaufman, N. L. 1972. Tests built from Piaget's and Gesell's tasks as predictors of first-grade achievement. CHILD DEVELOPMENT 43:521-535.

Keasey, C. T., and Charles, D. C. 1967. Conservation of substance in normal and mentally retarded children. JOURNAL OF GENETIC PSYCHOLOGY 111:271-279.

Keislar, E. R., and Stern, C. 1970. Differentiated instruction in problem solving for children of different mental ability levels. JOURNAL OF EDUCATIONAL PSYCHOLOGY 61:445-450.

Keister, B. V. 1941. Reading skills acquired by five-year-old children. ELEMENTARY SCHOOL JOURNAL 41:587-596.

Kendler, T. S. 1972. An ontogeny of mediational deficiency. CHILD DEVELOPMENT 43:1-17.

King, I. B. 1955. Effect of age of entrance into grade I upon achievement in elementary school. ELEMENTARY SCHOOL JOURNAL 55:331-336.

King, M. 1971. The development of some intention concepts in young children. CHILD DEVELOPMENT 42:1145-1152.

Klaus, M. H., et al. 1972. Maternal attachment: Importance of the first post-partum days. NEW ENGLAND JOURNAL OF MEDICINE 286:460-463.

Klaus, R., and Gray, S. 1968. The early training project for disadvantaged children: A report after five years. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT 33:4.

Klausmeier, H. J. 1963. Effects of accelerating bright older elementary pupils: A follow-up. JOURNAL OF EDUCATIONAL PSYCHOLOGY 54:165-171.

Klesius, S. E. 1971. Perceptual-motor development and reading: A closer look. ED 050 916.

Kohlberg, L. 1968. Early education: A cognitive-developmental view. CHILD DEVELOPMENT 39:1013-1062.

Kohlberg, L., and Zigler, E. 1967. The impact of cognitive maturity on the development of sex-role attitudes in the years 4 to 8. GENETIC PSYCHOLOGY MONOGRAPHS 75:89-165.

Kollros, J. J. 1968. Order and control of neurogenesis. In The emergence of order in developing systems, ed. M. Locke. New York: Academic Press.

Kounin, J. S., and Gump, P. V. 1961. The comparative influence of punitive and non-punitive teachers upon children's concepts of school misconduct. JOURNAL OF EDUCATIONAL PSYCHOLOGY 52:44-49.

Kraft, I., et al. 1968. *Prelude to school: An evaluation of an inner-city preschool program.* ED 033 750.

Krantz, M. 1972. Haptic recognition of objects in children. JOURNAL OF GENETIC PSYCHOLOGY 120:121-133.

Krider, M. A., and Petsche, M. 1967. *An evaluation of Head Start preschool enrichment programs as they affect the intellectual ability, the social adjustment, and the achievement level of five-year-old children enrolled in Lincoln, Nebraska.* ED 015 011.

Krippner, S. 1971. On research in visual training and reading disability. JOURNAL OF LEARNING DISABILITIES 4:65-76.

Krus, P., and Rubin, R. A. 1974. *Use of family history data to predict educational functioning from ages five through seven.* ED 090 274.

Kunz, J., and Moyer, J. E. 1969. A comparison of economically disadvantaged and economically advantaged kindergarten children. JOURNAL OF EDUCATIONAL RESEARCH 62:392-395.

L'Abate, L. 1962. Consensus of choice among children: A test of Piaget's theory of cognitive development. JOURNAL OF GENETIC PSYCHOLOGY 100:143-149.

Labov, W. 1970. The logical non-standard English. In *Language and Poverty,* ed. F. Williams, pp. 153-189. Chicago: Markham Press.

LaCrosse, R. E., et al. 1970. The first six years of life: A report on current research and educational practice. GENETIC PSYCHOLOGY MONOGRAPHS 82:161-266.

Lamb, H. E., et al. 1965. *The development of self-other relationships during project Head Start.* ED 015 008.

Lamson, E. E. 1940. A follow-up study of a group of nursery school children. *Yearbook for the National Society for the Study of Education,* vol. 39, part 2, pp. 231-236.

Larson, D. E. 1969. *The effect of a preschool experience upon intellectual functioning among four-year-old, white children in rural Minnesota.* ED 039 030.

________. 1972. Stability of gains in intellectual functioning among white children who attended a preschool program in rural Minnesota. ED 066 227.

Larson, R. G., and Olson, J. L. 1968. Compensatory education: How much is enough? JOURNAL OF NEGRO EDUCATION 37:164-167.

Lee, P. C., and Wolinsky, A. L. 1973. Male teachers of young children: A preliminary study. YOUNG CHILDREN 28:342-352.

Lessler, K., and Fox, R. E. 1969. An evaluation of a Head Start program in a low population area. JOURNAL OF NEGRO EDUCATION 38:46-54.

Levenstein, P. 1969. Individual variation among preschoolers in cognitive intervention program in low-income families. Paper presented at the Council for Exceptional Children, Conference on Early Childhood Education, New Orleans, Louisiana, December 12, 1969.

________. 1971. Learning through (and from) mothers. CHILDHOOD EDUCATION 48:130-134.

Levenstein, P., and Levenstein, S. 1971. Fostering learning potential in preschoolers. SOCIAL CASEWORK 52:74-78.

Levinson, B. M. 1961. Parental achievement drives for preschool children, the Vineland social maturity scale, and the social-deviation quotient. JOURNAL OF GENETIC PSYCHOLOGY 99:113-128.

Levy, D. M., and Tulchin, S. H. 1925. The resistant behavior of infants and children. JOURNAL OF EXPERIMENTAL PSYCHOLOGY 8:209-224.

Lewis, H. 1954. Deprived children. London: Oxford University Press.

Lewis, M. 1966. Probability learning in young children: The binary choice paradigm. JOURNAL OF GENETIC PSYCHOLOGY 108:43-48.

Liddle, G. P., and Rockwell, R. E. 1964. The role of parents and family life. JOURNAL OF NEGRO EDUCATION 33:311-317.

Liljefors, R. 1974. Interview with R. S. Moore, April, 1974.

Litman, F. 1969. Environment influences on the development of abilities. ED 032 126.

Little, W. B.; Kenny, C. T.; and Middleton, M. H. 1973. Differences in intelligence among low socioeconomic class Negro children as a function of sex, age, educational level of parents, and home stability. JOURNAL OF GENETIC PSYCHOLOGY 123:241-250.

Low, S., and Spindler, P. G. 1968. *Child care arrangements of working mothers in the United States.* Children's Bureau Publication no. 461. Washington, D.C.: U.S. Department of Health, Education, and Welfare.

Maccoby, E. E. 1966. Sex differences in intellectual functioning. In *The development of sex differences*, ed. E. E. Maccoby, pp. 25-55. Stanford, California: Stanford University Press.

Maccoby, E. E.; Dowley, E. M.; and Degerman, J. W. 1965. Activity level and intellectual functioning in normal preschool children. CHILD DEVELOPMENT 36:761-770.

Mallay, H. 1935. Growth in social behavior and mental activity after six months in nursery school. CHILD DEVELOPMENT 6:303-309.

Manis, M. 1958. Personal adjustment, assumed similarity to parents, and inferred parental evaluations of the self. JOURNAL OF CONSULTING PSYCHOLOGY 22:481-485.

Mannio, F. V. 1966. A cohort study of school withdrawals with implications for mental health. COMMUNITY MENTAL HEALTH JOURNAL 2:146-151.

Mariam, Sister. 1954. A comparative study of the reading disability in neurologically organized and neurologically disorganized fifth grade children. Doctoral dissertation, Loyola University, Chicago, Illinois.

Marshall, H. H. 1969. Learning as a function of task interest, reinforcement, and social class variables. JOURNAL OF EDUCATIONAL PSYCHOLOGY 60:133-137.

Marty, R., and Scherrer, J. 1964. Critères de maturation des systèmes afférents corticaux. PROGRESSIVE BRAIN RESEARCH 4:222-236.

Mason, G. E., and Prater, N. J. 1966. Social behavioral aspects of teaching reading to kindergartners. JOURNAL OF EDUCATIONAL RESEARCH 60:58-61.

Mawhinney, P. E. 1964. We gave up on early entrance. MICHIGAN EDUCATIONAL JOURNAL 41:25.

May, D., and Vinovskis, M. 1972. A ray of millenial light: Early education and social reform in infant school movement in Massachusetts, 1826-1840. Paper presented at the Clark University Conference on Family and Social Structure, April 22, 1972.

Mayeske, G. W. 1972. Similarities and dissimilarities in the dependence of achievement on family background and school factors for students of different and ethnic group membership. Paper presented to the American Educational Research Association, Chicago, April, 1972.

McAulay, J. D. 1961. What understandings do second grade children have of time relationships? JOURNAL OF EDUCATIONAL RESEARCH 54:312-314.

McCandless, B. 1967. Children: Behavior and development. New York: Holt, Rinehart and Winston.

McCarthy, D. J. 1955. Pre-entrance variables and school success of underage children. HARVARD EDUCATIONAL REVIEW 25:266-269.

McCracken, R. A. 1966. A two-year study of the reading achievement of children who were reading when they entered first grade. JOURNAL OF EDUCATIONAL RESEARCH 59:207-210.

McGeoch, J. A., and Irion, A. L. 1952. The psychology of human learning, 2nd edition. New York: Longmans, Green.

McGurk, H., and Lewis, M. 1972. Birth order: A phenomenon in search of an explanation. ED 067 156.

McKay, C. L., and Ryan, A. P. 1974. Visual characteristics of submarine school candidates, submariners and Navy divers. Naval Submarine Medical Research Laboratory, Report no. 767. Groton, Connecticut: Bureau of Medicine and Surgery, Navy Department, Submarine Base.

McLean, D. 1954. Child development: A generation of research. CHILD DEVELOPMENT 25:3-8.

McLeod, J.; Markowsky, M. D.; and Leong, C. K. 1972. A follow-up of early entrants to elementary schools. ELEMENTARY SCHOOL JOURNAL 73:10-19.

McMillan, M. 1919. The nursery school. London: J. M. Dent and Sons.

McNally, L. 1973. Living room school project. Final evaluation report, 1972-73. ED 082 850.

Meers, D. 1970. International day care: A selective review and psychoanalytic critique. Washington, D. C.: Office of Economic Opportunity.

Mermelstein, E., and Meyer, E. 1969. Conservation training techniques and their effects on different populations. CHILD DEVELOPMENT 40:471-490.

Mermelstein, E., and Shulman, L. S. 1967. Lack of formal schooling and the acquisition of conservation. CHILD DEVELOPMENT 38:39-52.

Metcalf, D. R. 1974. Letter to R. S. Moore, March 22, 1974.

Metcalf, D. R. 1975. An investigation of cerebral lateral functioning and the EEG. Report of a study made for the U.S. Office of Economic Opportunity under research grant no. 50079-G-73-02-1 to the Hewitt Research Foundation.

Metcalf, D. R., and Jordon, K.. 1972. EEG ontogenesis in normal children. In Drugs, development, and cerebral function, ed. W. L. Smith, pp. 125-144. Springfield, Illinois :Charles C. Thomas.

Meyers, E. 1966. Self-concept, family structure, and school achievement: A study of disadvantaged Negro boys. Doctoral dissertation, University of Florida, Gainesville, Florida.

Milgram, N. A., and Furth, H. G. 1967. Factors affecting conceptual control in normal and retarded children. CHILD DEVELOPMENT 38:531-543.

Milgram, N. A., and Ozer, M. N. The effects of neurological and environmental factors on the language development of Head Start children--an evaluation of the Head Start program. ED 017 317.

Miller, D. L. 1972. Preschooler's perceptions of parental attributes and their effect on behavior in nursery school. CHILD STUDY JOURNAL 2:197-203.

Miller, G. W. 1970. Factors in school achievement and social class. JOURNAL OF EDUCATIONAL PSYCHOLOGY 61:260-269.

Miller, J. W. 1968. Development of children's ability to coordinate perspectives. ED 016 516.

Miller, L. B. 1971. Experimental variation of Head Start curricula: A comparison of current approaches. Annual Progress Report, 1 March 1971-31 May 1971. Louisville, Ky.: University of Louisville, Department of Psychology.

________. 1972. Four preschool programs: Their dimensions and effects. Annual Progress Report, 1 June 1971-31 May 1972. Louisville, Ky.: University of Louisville, Department of Psychology.

Miller, W. H. 1969. When mothers teach their children. ELEMENTARY SCHOOL JOURNAL 70:38-42.

Milner, E. A. 1951. A study of the relationship between reading readiness in grade one school children and patterns of parent-child interactions. CHILD DEVELOPMENT 22:95-112.

Minton, C.; Kagan, J.; and Levine, J. A. 1971. Maternal control and obedience in the two-year-old. CHILD DEVELOPMENT 42:1873-1894.

Minuchin, S., et al. 1967. Families of the slums: An exploration of their structure and treatment. New York: Basic Books.

Mischel, W. 1966. A social-learning view of sex differences in behavior. In *The development of sex differences*, ed. E. E. Maccoby, pp. 56-81. Stanford, California: Stanford University Press.

Money, J. 1961. Sex hormones and other variables in human eroticism. In *Sex and internal secretions*, vol. II, ed. W. C. Young. Baltimore: Williams and Wilkins.

Money, J.; Hampson, J. G.; and Hampson, J. L. 1957. Imprinting and the establishment of gender roles. A.M.A., ARCHIVES OF NEUROLOGY AND PSYCHIATRY 77:333-336.

Monod, N., and Ducas, D. 1968. The prognostic value of the electroencephalogram in the first two years of life. In *Clinical electroencephalography of children*, ed. P. Kellaway and I. Petersen. New York: Grune and Stratton.

Moore, R. E., and Ogletree, E. J. 1973. A comparison of the readiness and intelligence of first grade children with and without a full year of Head Start training. EDUCATION 93:266-270.

Moore, R. S. 1973. Unpublished school entry-age case reports. On file at Hewitt Research Center, Berrien Springs, Michigan.

Moore, R. S.; Moon, R. D.; and Moore, D. R. 1972. The California report: Early schooling for all? PHI DELTA KAPPAN 53:615-621.

Moore, R. S., and Moore, D. N. 1975. *Better late than early*. New York: Reader's Digest Press.

Moore, R. S., and Moore, D. R. 1972. Early schooling for all? CONGRESSIONAL RECORD, October 16, 1972, pp. E8726-E8740.

________. 1973. How early should they go to school? CHILDHOOD EDUCATION 50:14-20.

Morency, A. 1968. Auditory modality, research and practice. In *Perception and reading*, ed. H. K. Smith, pp. 17-21. Newark, Delaware: International Reading Association.

Morency, A., and Wepman, J. M. 1973. Early perceptual ability and later school achievement. ELEMENTARY SCHOOL JOURNAL 73:323-327.

Moss, H. A. 1967. Sex, age, and state as determinents of mother-infant interaction. MERRILL-PALMER QUARTERLY 13:19-36.

Moss, H. A., and Kagan, J. 1958. Maternal influences on early IQ scores. PSYCHOLOGICAL REPORTS 4:655-661.

Moustakas, C. E. 1952. Personality studies conducted in nursery schools. JOURNAL OF EDUCATIONAL RESEARCH 46:161-177.

Mumpower, D. L. 1970. Sex ratios found in various types of referred exceptional children. EXCEPTIONAL CHILDREN 36:621-622.

Nagera, H. 1966. *Early childhood disturbances, the infantile neurosis, and the adulthood disturbances.* New York: International Universities Press.

Nathanson, I. T.; Towne, L. E.; and Aub, J. C. 1941. Normal excretion of sex hormones in childhood. ENDOCRINES 28:851-865.

National evaluations. 1972. *Effects of different Head Start program approaches on children of different characteristics: Report on analysis of data from 1966-67 and 1967-68.* ED 072 859.

Neale, D. C., and Proshek, J. M. 1967. School-related attitudes of culturally disadvantaged elementary school children. JOURNAL OF EDUCATIONAL PSYCHOLOGY 58:238-244.

Nelson, K. E., and Earl, N. 1973. Information search by preschool children: Induced use of categories and category hierarchies. CHILD DEVELOPMENT 44:682-685.

Nelson, W. E., ed. 1964. *Textbook of pediatrics,* 8th edition. Philadelphia: W. B. Saunders Company.

Neubauer, P. B. 1956. The child's growth toward maturity. CHILD STUDY 33:31-34.

Newton, F. H. 1972. Letter to R. S. Moore, October 24, 1972.

Nimnicht, G. P. 1972. Letter to R. S. Moore, September 29, 1972.

Noback, C. R., and Purpura, D. P. 1961. Postnatal ontogenesis of neurons in cat neocortex. JOURNAL OF COMPARATIVE NEUROLOGY 117: 291-307.

Northway, M. L. 1968. The stability of young children's social relations. EDUCATIONAL RESEARCH 11:54-57.

O'Brien, R. A., and Lopate, P. 1968. *Preschool programs and the intellectual development of disadvantaged children.* ED 024 473.

O'Brien, T., and Shapiro, B. J. 1968. The development of logical thinking in children. AMERICAN EDUCATIONAL RESEARCH JOURNAL 5:531-542.

Odom, R. D. 1967. Problem-solving strategies as a function of age and socioeconomic level. CHILD DEVELOPMENT 38:747-752.

O'Keefe, R. A. 1973. Home Start: Partnership with parents. CHILDREN TODAY 2:12-16.

Olmsted, P. P., and Jester, R. E. 1972. *How mothers teach.* ED 063 549.

Osborne, R. T., and Lindsey, J. M. 1965. A longitudinal investigation of change in the factorial composition of intelligence with age in young school children. ED 026 149.

Page, J. D. 1940. The effect of nursery school attendance upon subsequent IQ. JOURNAL OF PSYCHOLOGY 10:221-230.

Palermo, D. S., and Molfese, D. L. 1972. Language acquisition from age five onward. PSYCHOLOGICAL BULLETIN 78:409-428.

Palmer, F. H. 1968. Early intellective training and school performance. Summary of NIH grant no. HD-02253. ED 025 324.

Palmer, J. A. 1966a. "Preschool" education, pros and cons. A survey of "preschool" education with emphasis on research past, present, and future. ED 016 525.

________. 1966b. The effects of junior kindergarten on achievement--the first five years. ED 016 526.

Parten, M. D. 1932. Social participation among preschool children. JOURNAL OF ABNORMAL AND SOCIAL PSYCHOLOGY 27:243-269.

Peisach, E., and Wein, N. 1970. Relationship of conservation explanations to item difficulty. JOURNAL OF GENETIC PSYCHOLOGY 117:167-180.

Pestalozzi, J. H. 1898. Letters on early education. Syracuse, New York: C. W. Bardeen.

Peters, A., and Muir, A. R. 1959. The relationship between axons and schwann cells during development of peripheral nerves in the rat. QUARTERLY JOURNAL OF EXPERIMENTAL PHYSIOLOGY 44:117-130.

Petersén, I., Eeg-Olofsson, O., and Selldin, V. 1968. Paroxysmal activity in EEG of normal children. In Clinical electroencephalography of children, ed. P. Kellaway and I. Petersén. New York: Grune and Stratton.

Peterson, T. J. 1937. A preliminary study of the effects of previous nursery school attendance upon five-year-old children entering kindergarten. In Studies in preschool education. University of Iowa Studies in Child Welfare, vol. 14.

Phillips, J. L. 1969. The origins of intellect: Piaget's theory. San Francisco: W. H. Freeman & Company.

Piaget, J. 1952. The origins of intelligence in children (translated by M. Cook). New York: International Universities Press.

________. 1961. The genetic approach to the psychology of thought. JOURNAL OF EDUCATIONAL PSYCHOLOGY 52:275-281.

________. 1964. Development and learning. JOURNAL OF RESEARCH IN SCIENCE TEACHING 2:176-186.

Piaget, J.; Inhelder, B.; and Szeminska, A. 1960. The child's conception of geometry. New York: Basic Books.

Pidgeon, D. A. 1965. Date of birth and scholastic performance. EDUCATIONAL RESEARCH 8:3-7.

Pishkin, V., and Willis, D. J. 1974. Age, sex and socioeconomic factors in concept identification. PSYCHOLOGY IN THE SCHOOLS 2:85-90.

Polansky, N. A., et al. 1970. Two modes of maternal immaturity and their consequences. CHILD WELFARE 49:312-323.

Pollard, H. M. 1974. Pioneers of popular education. Westport, Connecticut: Greenwood Press.

Pontius, A. A. 1972. Neurological aspects in some type of delinquency, especially among juveniles. ADOLESCENCE 7:289-308.

Prestige, M. C. 1970. Differentiation, degeneration, and the role of the periphery: Quantitative considerations. In The neurosciences, ed. F. O. Schmitt. New York: The Rockefeller University Press.

Price-Williams, D. R. 1961. A study concerning concepts of conservation of quantities among primitive children. ACTA PSYCHOLOGICA 18:297-305.

Purkey, W. W. 1970. Self-concept and school achievement. Englewood Cliffs, N.J.: Prentice-Hall.

Purpura, D. P., and Schade, J. P. 1964. Growth and maturation of the brain. PROGRESSIVE BRAIN RESEARCH 4:1-10.

Purpura, D. P., Shofer, R. J., and Noback, C. R. 1964. Comparative ontogenesis of structure-function relations in cerebral and cerebellar cortex. PROGRESSIVE BRAIN RESEARCH 4:187-221.

Quigley, H. 1973. The pre-reading vocabulary of children leaving nursery school. EDUCATIONAL RESEARCH 16:28-33.

Rabinowicz, T. 1974. Some aspects of the maturation of the human cerebral cortex. In Pre- and postnatal development of the human brain, ed. S. R. Berenberg, M. Caniaris and N. P. Masse. Basal: S. Karger.

Radin, N. 1967. The role of socialization and social influence in a compensatory preschool program. ED 017 337.

________. 1971. Maternal warmth, achievement motivation, and cognitive functioning in lower-class preschool children. CHILD DEVELOPMENT 42:1560-1565.

________. 1973. Observed paternal behaviors as antecedents of intellectual functioning in young boys. DEVELOPMENTAL PSYCHOLOGY 8:369-376.

Radin, N., and Kamii, C. K. 1965. The child-rearing attitudes of disadvantaged Negro mothers and some educated implications. JOURNAL OF NEGRO EDUCATION 34:138-146.

Radke, M.; Trager, H. G.; and Davis, H. 1949. Social perceptions and attitudes of children. GENETIC PSYCHOLOGY MONOGRAPHS 40:327-447.

Rambusch, N. M. 1962. Learning how to learn. Baltimore: Helicon Press.

Reid, J. F. 1966. Learning to think about reading. EDUCATIONAL RESEARCH 9:56-62.

Reidford, P., and Berzonsky, M. 1969. Field test of an academically oriented preschool. ELEMENTARY SCHOOL JOURNAL 69:271-276.

Reilly, D. H. 1971. Auditory-visual integration, sex, and reading achievement. JOURNAL OF EDUCATIONAL PSYCHOLOGY 62:482-486.

Rhinehart, J. B. 1942. Some effects of a nursery school parent education program on a group of three-year-olds. JOURNAL OF GENETIC PSYCHOLOGY 61:153-161.

Richmond, B. O., and Norton, W. A. 1973. Creative production and developmental age in disadvantaged children. ELEMENTARY SCHOOL JOURNAL 73:279-284.

Riles, W. 1972. The early childhood education program proposal. Sacramento: California State Department of Education.

Riley, D. A.; McKee, J. P.; and Hadley, R. W. 1964. Prediction of auditory discrimination learning and transposition from children's auditory ordering ability. JOURNAL OF EXPERIMENTAL PSYCHOLOGY 67:324-329.

Riley, D. A., et al. 1967. Auditory discrimination in children: The effect of relative and absolute instructions on retention and transfer. JOURNAL OF EXPERIMENTAL PSCHOLOGY 73:581-588.

Rist, R. C. 1970. Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. HARVARD EDUCATIONAL REVIEW 40:411-451.

Robinson, H. B., and Robinson, N. M. 1971. Longitudinal development of very young children in a comprehensive day care program: The first two years. CHILD DEVELOPMENT 42:1673-1683.

Robinson, M. L. 1973. Compensatory education and early adolescence. Menlo Park, California: Stanford Research Center.

Robinson, R. J., and Tizard, J. P. M. 1966. The central nervous system in the newborn. BRITISH MEDICAL BULLETIN 22:49-55.

Roff, M. 1971. Childhood antecedents in the mental health development of three groups of adult males: Neurotics, severe bad conduct cases, and controls. Minneapolis: Institute of Child Development, University of Minnesota.

Rohwer, W. D. 1971. Prime time for education: Early childhood or adolescence? HARVARD EDUCATIONAL REVIEW 41:316-341.

________. 1973. Improving instruction in the 1970's--what could make a significant difference? Paper presented at the American Educational Research Association meeting, New Orleans, 1973.

________. 1975. Inequality in school success: The neglect of individuals. Address at National Education Association Conference on Educational Neglect. Washington, D.C., February, 1975.

Rohwer, W. D., et al. 1971. Population differences and learning proficiency. JOURNAL OF EDUCATIONAL PSYCHOLOGY 62:1-14.

Rosen, B. M.; Bahn, A. K.; and Kramer, M. 1964. Demographic and diagnostic characteristics of psychiatric clinic out-patients in the U.S.A., 1961. AMERICAN JOURNAL OF ORTHOPSYCHIATRY 34:455-468.

Rosen, C. L., and Ohnmacht, F. 1968. Perception, readiness, and reading achievement in first grade. In Perception and reading, ed. H. K. Smith, pp. 33-39. Newark, Delaware: International Reading Association.

Rosenthal, M. 1969. A comparison of reading readiness achievement of kindergarten children of disparate entrance ages. ED 033 745.

Rosenzweig, M. R.; Bennett, E. L.; and Diamond, M. C. 1972. Brain changes in response to experience. SCIENTIFIC AMERICAN 226:22-29.

Rosner, J. 1972. The development and validation of an individualized perceptual skills curriculum. Pittsburgh: Learning Research and Development Center, University of Pittsburgh.

________. 1973. Language arts and arithmetic achievement, and specifically related perceptual skills. AMERICAN EDUCATIONAL RESEARCH JOURNAL 10:59-68.

Ross, D., and Ross, S. 1969. Leniency toward cheating in preschool children. JOURNAL OF EDUCATIONAL PSYCHOLOGY 60:483-487.

Rothman, S. M. 1973. Liberating day care: A modest proposal. PHI DELTA KAPPAN 55:132-135.

Rubin, R. 1972. Sex differences in effects of kindergarten attendance on development of school readiness and language skills. ELEMENTARY SCHOOL JOURNAL 72:265-274.

Rudnick, M.; Sterritt, G. M.; and Flax, M. 1967. Auditory and visual rhythm perception and reading ability. CHILD DEVELOPMENT 38:581-587.

Saltz, E., and Johnson, J. 1973. Training for thematic-fantasy play in culturally disadvantaged children: Preliminary results. ED 086 334.

Satz, P., and Friel, J. 1974. Some predictive antecedents of specific reading disability: A preliminary two-year follow-up. JOURNAL OF LEARNING DISABILITIES 7:437-444.

Scarfe, N. V. 1972. The importance of security in the education of young children. INTERNATIONAL JOURNAL OF EARLY CHILDHOOD 4:27-30.

Schaefer, E. S. 1969. Need for early and continuing education. ED 040 750.

________. 1971. Toward a revolution in education: A perspective from child development research. NATIONAL ELEMENTARY SCHOOL PRINCIPAL 51:18-25.

________. 1972a. Does early education pay off? PTA MAGAZINE 67:8-10, 30.

________. 1972b. Parents as educators: Evidence from cross-sectional, longitudinal, and intervention research. YOUNG CHILDREN 27:227-239.

________. 1973. Child development research and the educational revolution: The child, the family and the education profession. ED 078 972.

________. 1974. The ecology of child development: Implications for research and the professions. Paper presented at the Symposium on the Role of Psychology in Studying and Helping Families with Problems. American Psychological Association, New Orleans, August, 1974.

Scheibel, A. B. 1962. Neural correlates of psychophysiological developments in the young organism. RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY 4:313-327.

Scherrer, J. 1968. Electrophysiological aspects of cortical development. PROGRESSIVE BRAIN RESEARCH 22:480-490.

Schwartz, I. R., Pappas, G. O., and Purpura, D. P. 1968. Fine structure of neurons and synapses in the feline hippocampus during postnatal ontogenesis. EXPERIMENTAL NEUROLOGY 22:394-407.

Scott, J. P. 1960. Comparative social psychology. In Principles of comparative psychology, eds. R. H. Waters, D. A. Rethingshafer, and W. E. Caldwell, pp. 250-288. New York: McGraw-Hill.

________. 1963. The process of primary socialization in canine and human infants. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT, vol. 28, no. 1 (serial no. 85).

Scott, P. M. 1972. About research. In The young child: Reviews of research, vol. 2, ed. W. W. Hartup, pp. 1-23. Washington, D.C.: National Association for the Education of Young Children.

Scott, R. 1973. Home Start: Family-centered preschool enrichment for black and white children. PSYCHOLOGY IN THE SCHOOLS 10:140-146.

________. 1974. Research and early childhood: The Home Start project. CHILD WELFARE 53:112-119.

Sears, R. R. 1972. Attachment, dependency, and frustration. In Attachment and dependency, ed. J. L. Gewirtz, pp. 1-27. Washington, D.C.: V. H. Winston & Sons.

Secord, P. 1967. A social psychological analysis of the transition from home to school. ED 015 017.

Seidel, H. E.; Barkley, M. J.; and Stith, D. 1967. Evaluation of a program for project Head Start. JOURNAL OF GENETIC PSYCHOLOGY 110:185-197.

Shapiro, B. J., and O'Brien, T. C. 1970. Logical thinking in children ages six through thirteen. CHILD DEVELOPMENT 41:823-829.

Shapiro, E., and Biber, B. 1972. The education of young children: A developmental-interaction approach. TEACHERS COLLEGE RECORD 74:55-79.

Shaw, M. C., and Dutton, B. E. 1965. The use of the parent-attitude research inventory with the parents of bright academic underachievers. In The self in growth, teaching, and learning: Selected readings, ed. D. E. Hamachek, pp. 493-500. Englewood Cliffs, N. J.: Prentic-Hall.

Shearer, E. 1967. The effect of date of birth on teachers' assessments of children. EDUCATIONAL RESEARCH 10:51-56.

Sheldon, W. D. 1970. Teaching reading to the disadvantaged: Progress and promise. ED 045 311.

Shepherd, C. W. 1969. Childhood chronic illness and visual motor perceptual development. EXCEPTIONAL CHILDREN 36:39-42.

Shields, M. M., and Steiner, E. 1973. The language of three-to-five-year-olds in preschool education. EDUCATIONAL RESEARCH 15:97-105.

Shriner, T., and Daniloff, R. 1970. Reassembly of segmented CVC syllables by children. JOURNAL OF SPEECH AND HEARING RESEARCH 13:537-547.

Sigel, I. E., and Hooper, F. 1968. Logical thinking in children. New York: Holt, Rinehart and Winston.

Sigel, I. E.; Jarman, P.; and Hanesian, H. 1963. Styles of categorization and their perceptual, intellectual, and personality correlates in young children. Unpublished paper, Merrill-Palmer Institute.

Sigel, I. E., and Mermelstein, E. 1965. Effects of nonschooling on Piagetian tasks of conservation. Paper presented at American Psychological Association meeting, September, 1965.

Sigel, I. E., et al. 1972. Psycho-educational intervention beginning at age two: Reflections and outcomes. ED 069 161.

Silberberg, N. E., and Silberberg, M. C. 1969. Myths in remedial education. JOURNAL OF LEARNING DISABILITIES 2:209-217.

Silberberg, N. E.; Silberberg, M. C.; and Iversen, I. A. 1972. The effects of kindergarten instruction in alphabet and numbers on first grade reading. JOURNAL OF LEARNING DISABILITIES 5:254-261.

Simmons, S. V. 1958. A study of the chronological age of children in relation to their achievement in school. Unpublished paper, Emory University, Atlanta, Ga.

Simon, M. D. 1959. Body configuration and school readiness. CHILD DEVELOPMENT 30:493-512.

Simpson, E. J. 1973. The home as a career education center. EXCEPTIONAL CHILDREN 39:626-630.

Skeels, H. M. 1966. Adult status of children with contrasting early life experiences. MONOGRAPHS OF THE SOCIETY FOR RESEARCH IN CHILD DEVELOPMENT, vol. 31, no. 3 (serial no. 105).

Skeels, H. M., et al. 1938. A study of environmental stimulation: An orphanage preschool project. University of Iowa Studies in Child Welfare, vol. 15, no. 4.

Skoglund, S. 1960. The activity of muscle receptors in the kitten. ACTA PHYSIOLOGICA SCANDINAVICA. 50:203-221.

Skoglund, S. 1969. Growth and differentiation. ANNUAL REVIEW OF PHYSIOLOGY 31:19-42.

Smith, J. R. 1937. The origin and genesis of rhythm in the electroencephalogram. PSYCHOLOGICAL BULLETIN 34:534-535.

Smith, M. B. 1968. School and home: Focus on achievement. In Developing programs for the educationally disadvantaged, ed. A. H. Passow, pp. 89-107. New York: Columbia University Teachers College Press.

Smith, M. P. 1968. Intellectual differences in five-year-old underprivileged girls and boys with and without prekindergarten school experiences. JOURNAL OF EDUCATIONAL RESEARCH 61:348-350.

Smith, N. B. 1965. Early reading: Viewpoints. CHILDHOOD EDUCATION 42:229-241.

Soares, A. T., and Soares, L. M. 1969. Self-perceptions of culturally disadvantaged children. AMERICAN EDUCATIONAL RESEARCH JOURNAL 6:31-45.

Soares, L. M., and Soares, A. T. 1970-71. Self-concepts of disadvantaged and advantaged students. CHILD STUDY JOURNAL 1:69-73.

Sontag, M.; Sella, A. P.; and Thorndike, R. L. 1969. The effect of Head Start training on the cognitive growth of disadvantaged children. JOURNAL OF EDUCATIONAL RESEARCH 62:387-389.

Spaulding, R. L., and Katzenmeyer, W. G. 1969. Effects of age of entry and duration of participation in a compensatory education program. ED 043 380.

Spelke, E., et al. 1973. Father interaction and separation protest. DEVELOPMENTAL PSYCHOLOGY 9:83-90.

Spicker, H. H. 1971. Intellectual development through early childhood education. EXCEPTIONAL CHILDREN 37:629-640.

Spitalny, T. 1957. Battles and "best friends" in the nursery school. CHILD STUDY 34:8-12.

Spitz, R. A. 1949. The role of ecological factors in emotional development in infancy. CHILD DEVELOPMENT 20:145-155.

Spodek, B. 1973. Early childhood education. Englewood Cliffs, N. J.: Prentice-Hall.

Sprigle, H. 1974. Learning to learn program. In Longitudinal evaluations of preschool programs, ed. S. Ryan, pp. 109-124. Washington, D.C.: Office of Child Development.

Stanners, R. F., and Soto, D. H. 1967. Developmental changes in the recognition of beginning segments of English words. JOURNAL OF EDUCATIONAL PSYCHOLOGY 58:273-277.

Stearns, M. S. 1971. Report on preschool programs: The effects of preschool programs on disadvantaged children and their families. Final report. ED 062 025.

Steinhilber, A. W., and Sokolowski, C. J. 1966. State law on compulsory attendance. Washington, D. C.: Office of Education.

Stephens, M. W., and Delys, P. 1973. External control expectancies among disadvantaged children at preschool age. CHILD DEVELOPMENT 44:670-674.

Stern, C. 1967. Acquisition of problem-solving strategies in young children and its relation to verbalization. JOURNAL OF EDUCATIONAL PSYCHOLOGY 58:245-252.

Stevenson, H. W., and Siegel, A. 1969. Effects of instructions and age on retention of filmed content. JOURNAL OF EDUCATIONAL PSYCHOLOGY 60:71-74.

Stevenson, H. W.; Williams, A. M.; and Coleman, E. 1971. Interrelations among learning and performance tasks in disadvantaged children. JOURNAL OF EDUCATIONAL PSYCHOLOGY 62:179-184.

Stone, J. L., and Church, J. 1973. Childhood and adolescence. New York: Random House.

Strag, G. A., and Richmond, B. O. 1973. Auditory discrimination techniques for young children. ELEMENTARY SCHOOL JOURNAL 73:447-454.

Strauss, S., and Langer, J. 1970. Operational thought inducement. CHILD DEVELOPMENT 41:163-175.

Streff, J. W. 1974. Preliminary report on visual changes of children in Cheshire public schools. Unpublished manuscript, Vision Research, Gesell Institute, New Haven, Connecticut.

Strom, R. D. 1965. What is the school speed-up doing to children? ELEMENTARY SCHOOL JOURNAL 65:206-207.

Sullivan, H. S. 1953. The interpersonal theory of psychiatry. New York: W. W. Norton and Company.

Sutton, M. J. 1969. Children who learned to read in kindergarten: A longitudinal study. READING TEACHER 22:595-602.

Suviranta, A. 1973. Home economics answer to the problems raised in industrialized countries. In XIIth Congress of the International Federation for Home Economics, Final Report, pp. 92-99. Boulogne, France: Federation Internationale pour l'economic familiale.

Sweet, J. R., and Thornburg, K. R. 1971. Preschoolers' self and social identity within the family structure. JOURNAL OF NEGRO EDUCATION 40:22-27.

Tanner, J. M. 1961. Education and physical growth. New York: International Universities Press.

________. 1962. Growth at adolescence (second edition). Oxford: Blackwell Scientific Publications.

Taylor, B. J., and Howell, R. J. 1973. The ability of three-, four-, and five-year-old children to distinguish fantasy from reality. JOURNAL OF GENETIC PSYCHOLOGY 122:315-318.

Theis, S. V. 1924. How foster children turn out. New York: State Charities Aid Association Publication no. 165.

Tocco, T. S., and Bridges, C. M. 1973. The relationship between the self-concepts of mothers and their children. CHILD STUDY JOURNAL 3:161-179.

Tolor, A.; Scarpetti, W.; and Lane, P. A. 1967. Teachers' attitudes toward children's behavior revisited. JOURNAL OF EDUCATIONAL PSYCHOLOGY 58:175-180.

Towler, J. O. 1968. Training effects and concept development--A study of the conservation of continuous quantity in children. ED 016 533.

Trowbridge, N. T. 1969. Project IMPACT research report 1968-1969. Washington, D.C.: U. S. Office of Education Cooperative Research Report.

________. 1970. Effects of socioeconomic class on self-concept of children. PSYCHOLOGY IN THE SCHOOLS 7:304-306.

________. 1972. Self-concept and socioeconomic status in elementary school children. AMERICAN EDUCATIONAL RESEARCH JOURNAL 9:525-537.

Tuddenham, R. D. 1952. Studies in reputation: I. Sex and grade differences in school children's evaluation of their peers. II. The diagnoses of social adjustment. PSYCHOLOGICAL MONOGRAPHS, vol. 66, no. 333.

Tulkin, S. R., and Kagan, J. 1972. Mother-child interaction in the first year of life. CHILD DEVELOPMENT 43:31-41.

Turner, R. V., and DeFord, E.F. 1970. Follow-up study of pupils with differing preschool experiences. ED 042 810.

Tyler, F. B.; Rafferty, J. E.; and Tyler, B. B. 1962. Relationships among motivations of parents and their children. JOURNAL OF GENETIC PSYCHOLOGY 101:69-81.

Tyler, S. 1970. Cognitive anthropology. New York: Holt, Rinehart and Winston.

Van Alstyne, D., and Hattwick, L. A. 1939. A follow-up study of the behavior of nursery school children. CHILD DEVELOPMENT 10:43-72.

Vance, B. J. 1967. The effect of preschool group experience on various language and social skills in disadvantaged children. ED 019 989.

Van de Riet, V., and Resnick, M. B. 1972a. A sequential approach to early childhood and elementary education, phase III. ED 067 150.

________. 1972b. A longitudinal study of the intellectual growth of culturally disadvantaged children in a sequential learning to learn program. ED 070 791.

Van de Riet, V., and Van de Riet, H. 1967. An evaluation of the effects of a unique sequential learning program on culturally deprived preschool children. ED 019 994.

Van der Veen, F., et al. 1964. Relationships between the parents' concept of the family and family adjustment. AMERICAN JOURNAL OF ORTHOPSYCHIATRY 34:45-55.

Vande Voort, L.; Serf, G. M.; and Benton, A. L. 1972. Development of audio-visual integration in normal and retarded readers. CHILD DEVELOPMENT 43:1260-1272.

Vaughan, H. 1974. Studies in neuropsychology. In *Methodological approaches to the study of brain maturation and its abnormalities*, ed. D. P. Purpura and G. P. Reaser. Baltimore: University Park Press.

Vernon, P. E. 1965. Ability factors and environmental influences. AMERICAN PSYCHOLOGIST 20:723-733.

________. 1967 [date of study]. Abilities and educational attainments in an East African environment. In *Cross-cultural studies*, ed. D. R. Price-Williams, pp. 76-91. Baltimore: Penguin, 1969.

Wachs, T. D., et al. 1967. *Cognitive development in infants of different age levels and from different environmental backgrounds.* ED 015 786.

Waller, D. A., and Conners, C. K. 1966. *A follow-up study of intelligence changes in children who participated in project Head Start*. ED 020 786.

Washburn, T. C.; Medearis, D. N.; and Childs, B. 1965. Sex differences in susceptibility to infections. PEDIATRICS 35:57-69.

Wattenberg, W. W., and Clifford, C. 1964. Relation of self-concepts to beginning achievement in reading. CHILD DEVELOPMENT 35:461-467.

Weber, G. 1971. *Inner-city children can be taught to read: Four successful schools.* Washington, D. C.: Council for Basic Education.

Webster, S. W. 1965. Some correlates of reported academically supportive behaviors of Negro mothers toward their children. JOURNAL OF NEGRO EDUCATION 34:114-120.

Wei, T. T. D.; Lavatelli, C. B.; and Jones, R. S. 1971. Piaget's concept of classification: A comparative study of socially disadvantaged and middle-class young children. CHILD DEVELOPMENT 42:919-927.

Weikart, D. P. 1970a. *The cognitively oriented curriculum: A framework for preschool teachers*. ED 044 535.

________. 1970b. *Longitudinal results of Ypsilanti Perry preschool project*. ED 044 536.

Weikart, D. P.; Deloria, D. J.; and Lawsor, S. 1974. Results of a preschool intervention project. In *Longitudinal evaluations of preschool programs*, ed. S. Ryan, pp. 125-133. Washington, D. C.: Office of Child Development.

Weikart, D. P., and Lambie, D. Z. 1969. *Ypsilanti-Carnegie infant education project progress report.* Department of Research and Development, Ypsilanti Public Schools, Ypsilanti, Michigan.

Weininger, O. 1956. The effects of early experience on behavior and growth characteristics. THE JOURNAL OF COMPARATIVE AND PHYSIOLOGICAL PSYCHOLOGY 49:1-9.

Weininger, O. 1974. *Early school entry: A study of some difference in children remaining at home and those attending school.* ED 096 003.

Weininger, O. 1975a. Yesterday I talked to my child. An approach to developmental linguistics. Unpublished manuscript. Ontario Institute for Studies in Education.

Weininger, O. 1975b. Personal communication with Raymond S. Moore.

Weininger, O. 1975c. Misery or magic: Reading as a process. EDUCATIONAL COURIER, May, 1975.

Weiss, P. 1958. Summary and evaluation. In *The chemical basis of development*, ed. W. D. McElroy and B. Glass. Baltimore: Hopkins Press.

Weller, G. M., and Bell, R. Q. 1965. Basal skin conductance and neonatal state. CHILD DEVELOPMENT 36:647-657.

Wellman, Beth L. 1934. Growth in intelligence under differing school environments. JOURNAL OF EXPERIMENTAL EDUCATION 3:59-83.

Wells, M. E. 1970. Preschool play activities and reading achievement. JOURNAL OF LEARNING DISABILITIES 3:214-219.

Wepman, J. M. 1960. Auditory discrimination, speech, and reading. ELEMENTARY SCHOOL JOURNAL 60:325-333.

________. 1968. The modality concept. In *Perception and reading,* ed. H. K. Smith, pp. 1-6. Newark, Delaware: International Reading Association.

Westinghouse Learning Corporation/Ohio University. 1970. The impact of Head Start: An evaluation of the effects of Head Start on children's cognitive and affective development. In *The disabled child*, second edition, eds. J. L. Frost and G. R. Hawkes, pp. 197-201. Boston: Houghton Mifflin.

White, B. L. 1972. *Setting priorities in early education*. Paper presented at Education Commission of States Conference, December, 1972.

________. 1973. *Making sense out of our education priorities*. ED 085 087.

________. 1974. Reassessing our educational priorities. In *Implementing child development programs: Report of an August, 1974, national symposium,* pp. 8-18. Denver, Colorado: Education Commission of the States.

White, R. W. 1959. Motivation reconsidered: The concept of competence. PSYCHOLOGICAL REVIEW 68:297-333.

White, S. H. 1968. Some educated guesses about cognitive development in the preschool years. In Early education: Current theory, research and practice, eds. R. Hess and R. M. Bear, pp. 203-214. Chicago: Aldine.

_________. 1969. Statement in hearings before the select subcommittee on education. In Comprehensive preschool education and child day-care act of 1969, pp. 46-62. Washington, D. C.: U. S. Congress, House, November 20, 1969.

_________. 1973. Federal programs for young children. Unpublished manuscript. Cambridge, Massachusetts: Huron Institute.

Whiteman, M. 1967. Children's conceptions of psychological causality. CHILD DEVELOPMENT 38:143-155.

Whiting, B., and Edwards, C. P. 1973. A cross-cultural analysis of sex differences in the behavior of children aged three through eleven. JOURNAL OF SOCIAL PSYCHOLOGY 91:171-188.

Whiting, J., and Whiting, B. 1962 [date of study]. Reference from annotated bibliography compiled by R. M. Oetzel. In The development of sex differences, ed. E. E. Maccoby. Stanford, California: Stanford University Press, 1966.

Wiener, G. G.; Rider, R. V.; and Oppel, W. 1963. Some correlates of IQ changes in children. CHILD DEVELOPMENT 34:61-67.

Williams, H. L. 1970. Aspects of human intelligence. In The neurosciences, ed. F. O. Schmitt. New York: The Rockefeller University Press.

Williams, J. P.; Blumberg, E. L.; and Williams, D. V. 1970. Cues used in visual word recognition. JOURNAL OF EDUCATIONAL PSYCHOLOGY 61:310-315.

Williams, R. 1971. Testing for number readiness: Application of the Piagetian theory of the child's development of the concept of number. JOURNAL OF EDUCATIONAL RESEARCH 64:394-396.

Willmon, B. 1969. Parent participation as a factor in the effectiveness of Head Start programs. JOURNAL OF EDUCATIONAL RESEARCH 62:406-410.

Willoughby, R. H. 1973. Age and training effects in children's conditional matching to sample. CHILD DEVELOPMENT 44:143-148.

Witherspoon, R. L. 1968. *Effect of trimester school operation on the achievement and adjustment of kindergarten and first through third grade children.* ED 020 003.

Witkin, H. A., et al. 1954. *Personality through perception.* New York: Harper.

Wolf, R. M. 1964. Identification and measurement of environmental process variables related to intelligence. Unpublished dissertation. Chicago: University of Chicago.

Wolff, P. 1965. Unpublished paper presented at the Tavistock Conference on determinants of infant behavior, London, September, 1965.

Wolff, P.; Levin, J. R.; and Llongobardi, E. T. 1974. Activity and children's learning. CHILD DEVELOPMENT 45:221-223.

Worcester, D. A. 1956. *The education of children of above-average mentality.* Lincoln: University of Nebraska Press.

Wylie, R. C. 1961. *The self-concept: A critical survey of pertinent research literature.* Lincoln: University of Nebraska Press.

Yakovlev, P. I. 1972. Letter to R. S. Moore, July 25, 1972.

Yakovlev, P. I., and Lecours, A. R. 1967. The myelogenetic cycles of regional maturation of the brain. In *Regional development of the brain in early life,* ed. A. Minkowski. Oxford: Blackwell Scientific Publications.

Yarrow, L. J. 1956. The development of object relationships during infancy and the effects of a disruption of early mother-child relationships. AMERICAN PSYCHOLOGIST 11:423 (abstract).

________. 1961. Maternal deprivation: Toward an empirical and conceptual reevaluation. PSYCHOLOGICAL BULLETIN 58:459-490.

________. 1964. Separation from parents during early childhood. In *Child Development Research I,* eds. M. L. Hoffman and L. W. Hoffman, pp. 89-130. New York: Russell Sage Foundation.

________. 1967. The development of focused relationships during infancy. In *Exceptional infant*, vol. 1, ed. J. Hellmuth, pp. 429-442. Seattle, Washington: Special Child Publications.

________. 1972. Attachment and dependency: A developmental perspective. In *Attachment and dependency,* ed. J. L. Gewirtz, pp. 81-95. Washington, D.C.: V. H. Winston & Sons.

Yarrow, L. J., and Pedersen, F. A. 1972. Attachment: Its origins and course. In *The young child: Reviews of research,* ed. W. W. Hartup, pp. 54-66. Washington, D. C.: National Association for the Education of Young Children.

Yarrow, M. R. 1973. Research on child rearing as a basis for practice. CHILD WELFARE 52:209-219.

Young, B. W. 1969. *Inducing conservation of number, weight, volume, area, and mass in preschool children.* ED 028 822.

Young, F. A. 1962. The effect of nearwork illumination level on monkey refraction. AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY 39:60-67.

________. 1963. The effect of restricted visual space on the refractive error of the young monkey eye. INVESTIGATIVE OPHTHALMOLOGY 2:571-577.

________. 1970. Development of optical characteristics for seeing. In *Early experience and visual information processing in perceptual and reading disorders,* eds. F. A. Young and D. B. Lindsley, pp. 35-61. Washington, D. C.: National Academy of Sciences.

Young, F. A., et al. 1969. The transmission of refractive errors within Eskimo families. AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY 46:676-685.

Zigler, E. 1968. *Training the intellect versus development of the child*. ED 034 573.

________. 1971. Opening address at Home Start Planning Conference, October 21-22, 1971. Washington, D. C.: Office of Child Development.

Zigler, E., and Butterfield, E. C. 1968. Motivational aspects of changes in IQ test performance of culturally deprived nursery school children. CHILD DEVELOPMENT 39:1-14.